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A Modern Material Handling Plant

St. Louis Material and Supply Co. Has New Plant for the Storage and Delivery of Sand

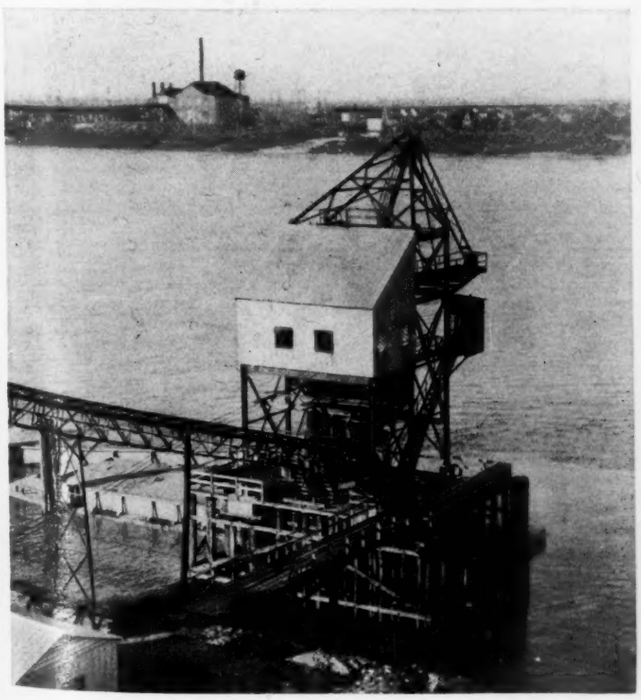
A VERY complete and thoroughly modern plant for the storage and handling of sand was recently completed by the St. Louis Material and Supply Co. at its Branch street yard in St. Louis. The plant, which is located on the bank of the Mississippi river about three miles north of the downtown business section, receives its material from dredges working in the river.

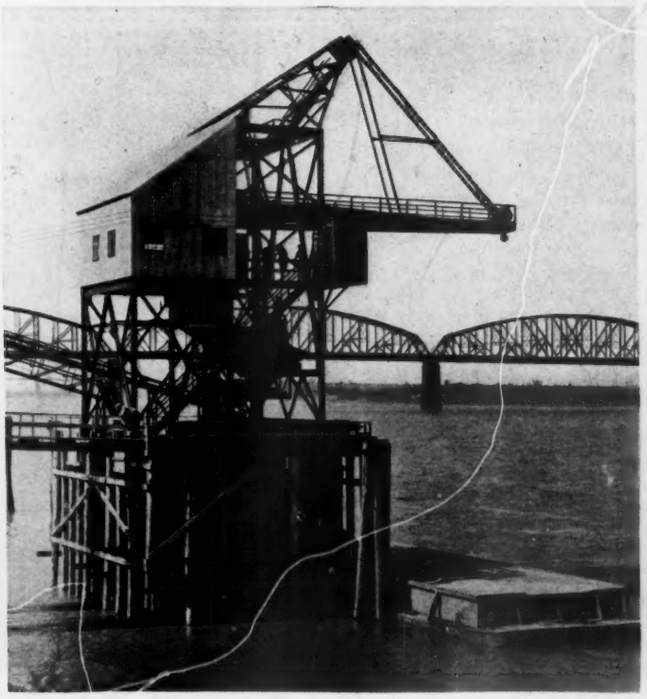
The sand is washed and screened on the dredges and the sized material is then handled in barges to the plant, where it is put into storage and delivered as needed to trucks or railroad cars. A stationary gantry crane at the river's edge is used for unloading the barges, the sand being then carried to storage on an inclined belt conveyor and a long shuttle conveyor in a gallery above the storage space.

Storage at left and unloading crane and dock at right

From storage the sand is reclaimed by belt conveyor in a tunnel below the pile and is carried on an inclined belt conveyor over to the truck or car loading bins.

An interesting and unusual feature of the plant is the use of circular steel pipe or tank





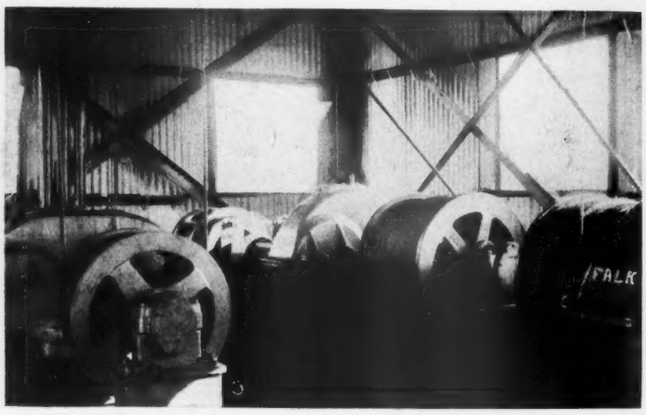
Two views of the barge unloading crane at the Branch street plant of the St. Louis Material and Supply Co.

View showing storage piles at right and loading bins at left

sections as supports for the conveyor gallery and as loading bins. The arrangement gives a large storage capacity and the plant was designed to handle up to 45 cars of material per day.

Barge Unloading Equipment

The steel structure of the gantry crane is supported on a square of wooden piling which is thoroughly braced and tied together and includes a cantilever bridge extending out over the barge. A 2½-yd. Owens clamshell bucket is used.

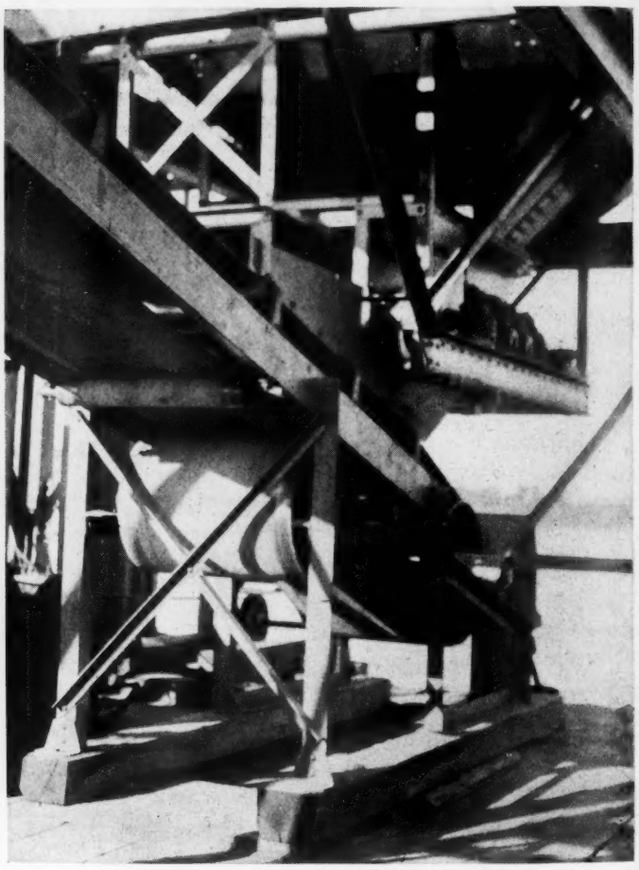


Hoist drums and drives of the unloading crane

The operating mechanism is located in a hoist house located on the shore end of the crane structure and consists of three individually driven drum hoists. Two of these are driven by 60-hp. General Electric motors through Falk speed reducers, and the third by a 40-hp. General Electric motor through a Falk reducer.

All motors are equipped with solenoid brakes and the drums are arranged with counterweights. The control house is located at the outer corner of the crane frame, with a free view of both barge and loading hopper.

The bucket is emptied to a large steel hopper built into the crane structure and arranged with an automatic feeder below. This feeder, which is of the continuous conveyor type and is chain-driven from the tail shaft of the conveyor, provides an even flow of material to the 30-in. inclined belt conveyor extending up to the center of the storage space.



Hopper and feeder at unloading crane

Shuttle Conveyor Used to Distribute to Storage

The inclined conveyor discharges to a reversible shuttle type belt conveyor a little less than half as long as the storage pile and from which the material may be discharged direct to any part of the pile. Ordinarily three sizes of material are stored: bricklayers' sand, plasterers' sand, and concrete sand.

The shuttle conveyor, which is motor-driven through a Falk reducer and chain drive, is movable on a track extending along the length of the overhead gallery. Power for its operation is obtained through a short cable by plugging in to any one of a number of Crouse-Hinds plug receptacles located at intervals along the gallery.

The gallery above the storage pile is parallel to the river and is made up of four 125-ft. double steel trusses in line, with a total length of 500 ft. These trusses, which are 55 ft. above ground line, are supported on five equally spaced towers. Each tower consists of 22 2½-ft. sections of circular steel units 9 ft. in diameter.

Looking toward loading end of plant, loading bins in foreground and storage piles beyond

Below the storage pile is a large concrete tunnel with arched roof and feed gates through which the material is fed to belt conveyors. Two conveyors are used, extending from each end of the tunnel to the central point. There they discharge to a small hopper from which the material is fed to an inclined belt conveyor extending at right angles to the pile up to the top of two loading bins.

These loading bins are made up of the same sections as the gallery supporting towers, but not as high, and are arranged with gates and loading chutes on both sides. The material from the conveyor may be spouted to either bin.

On each side of the bins is a railroad track for car loading. The track on the side toward the river is planked over for truck loading. Cars are weighed on a Howe track scale and trucks are weighed on a platform scale at the plant office.

Some city deliveries are made by truck, but most shipments are by rail, as the plant is located on the St. Louis Terminal railroad, which has connections throughout the city. About 80% of the shipments are to points within the city and county.

The St. Louis Material and Supply Co. operates three other yards in the St. Louis area, but the Branch street plant is now the largest and most complete. The main offices of the company are at 314 North Fourth Street, St. Louis. Otto S. Conrades is president and A. J. Protle is superintendent in charge of plants.

Develops Early Strength Cement

A HIGH EARLY STRENGTH cement has been developed by the Hawkeye Portland Cement Co., Des Moines, Ia. According to the *Des Moines Tribune*, the new cement makes concrete that can be used in 24 hours, has the same ingredients as standard portland cement, and is handled in the same way.

Opening a New Quarry

DETAILS of a quarry blast at a new crushed stone operation which was opened up this year are given in a recent issue of *The Explosives Engineer*.

The new quarry is that of the L. Suzio Trap Rock Co. near Springfield, Mass. The crushing plant, which was built during the first part of the year, is Allis-Chlamers equipped and has a capacity of about 1000 tons per day. Crushing is done in a primary No. 7½ gyratory crusher, followed by two No. 4 secondary crushers.

Tunnel blasting was used as being the best method of quarrying the 125-ft. ledge of trap rock. A preliminary blast, using four tons of dynamite, was made in the spring to open up a face and get a level floor. This was followed by a second blast in July in which 9850 lb. of dynamite were used, bringing down an estimated 50,000 tons of rock.

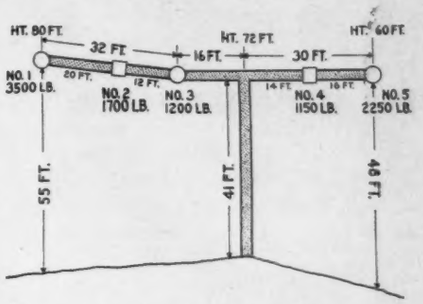
The tunnel, 3 ft. by 4 ft. in section and with wells 2 to 3 ft. deep for the charges, was drilled in about 20 days. Its length and shape, as well as the location of the charges, are shown in the accompanying diagram. Hercomite in 12½-lb. bags and 5- by 16-in. cartridges of Gelamite A are used according to the following table:

Charge No.	Gelamite A lb.	Hercomite Bag lb.
1	1200	2300
2	200	1500
3	150	1100
4	150	1000
5	1150	1100
	2850	7000

Total—9850 lb.

The Gelamite A was used as a priming charge in the center of each charge and in conjunction with Hercomite in the end pockets because of the presence of some water.

In order to reduce the likelihood of failure due to breakage of wires, duplicate electric circuits were used and two electric blasting caps were used for each circuit, or four blasting caps in each charge. All wires were strung on pegs in the upper corner of the tunnel and the shot was fired by connection with a 440-volt power line.



Plan showing location and size of charges

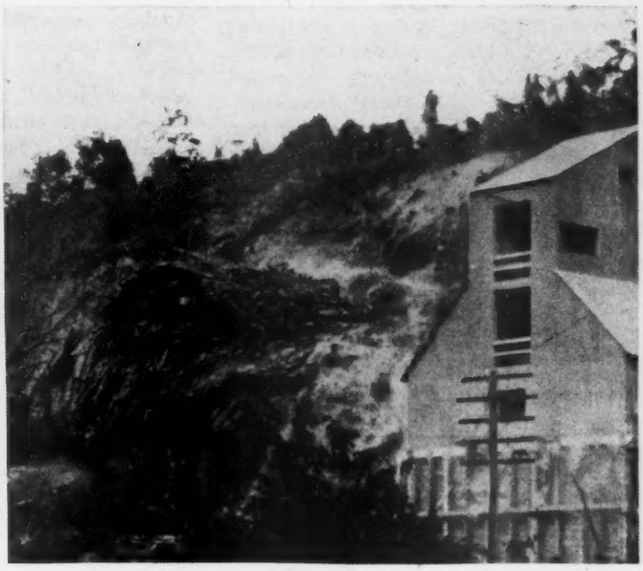
Rock screenings were used as stemming between the charges and in the main tunnel entrance and loading and stemming was completed in less than two shifts. The blast was made under the direction of J. Barab of the Hercules Powder Co., working in conjunction with Mr. Suzio.

Leonardo Suzio of Meriden, Conn., is in charge of all operations and E. C. Stein is superintendent.

Methods of Promoting County Bond Issues

A BULLETIN has been issued by the American Road Builders' Association on Administrative and Financial Relationship of State and County and on Methods of Promoting County Bond Issues. This bulletin, No. 31, is a combined committee report of the groups made at the annual meeting of the association at its 1932 meeting.

Blasted rock, viewed from crushing plant



View taken as blast was fired

The Manufacture of Portland Cement*

Part VII—Properties of Cement and Effects of Components (Continued)

By S. E. Hutton
Consulting Engineer, Seattle, Wash.

THE APPEARANCE of concrete is affected principally by the character of form surfaces, by presence or absence of "gravel pockets," joints, and other effects of too much water, too little cement, segregation of aggregates, poor craftsmanship, and color.

Some cements produce more plastic concrete than others, and are preferred because there is less segregation of aggregates of different sizes, less labor is required in placing the concrete so as to fill the constricted spaces between steel reinforcing bars and so as to avoid stone pockets, less labor is required in finishing surfaces, and denser concrete is produced with them than with harsh cements.

The qualities generally referred to as plasticity or workability in cement or concrete have not been very precisely defined, and no satisfactory methods of testing and measuring them have been developed, but their effects are obvious and valuable to the concrete worker. Many hypotheses have been offered to explain the differences in the plasticities of pastes made from different cements, but most of them are not supported by precise experimental data. Experiments have seemed to confirm the belief that plaster of Paris, replacing a part of the gypsum required with a cement, has the effect of increasing its plasticity. Fine grinding is definitely a contribution to plasticity. High contents of tricalcium aluminate and tetracalcium alumino ferrite may develop hydration products quickly enough to contribute to plasticity, but other constituents of cement do not. Additions of extremely fine materials, such as diatomaceous earth or colloidal clay, improve the plasticity of cements low in fine flour content, but have negligible effects on many cements.

Color in cement is due chiefly, if not entirely, to the presence of iron or manganese, or both. A cement containing little or none of these is white. The usual effect of iron is to contribute toward a cold blue gray color, but if not oxidized to the ferric state, it contributes a yellowish cast, such as is seen in clinker submitted to reducing conditions. Manganese produces a brownish cast of color. Finer grinding produces lighter shades, as may be shown by separating ground cement into different fine sizes, or by taking samples as grinding proceeds beyond the usual ranges. Particles between 100 and 200 mesh (0.147 and 0.074 m.m.) sizes are almost black, those below 0.01 m.m. almost white.

Cements high in free lime, and possibly those high in tricalcium silicate, may cause efflorescence (a deposit of white crystals) on concrete, particularly when used with excess of mixing water, or in poorly made concrete.

Setting Time

The setting time is an important quality of cement, for it affects materially the handling of concrete work. Setting is due to the hydration of tricalcium aluminate and tetracalcium alumino ferrite, and is delayed by the addition of gypsum, with which the tricalcium aluminate hydrate forms sulfoaluminate. Until the gypsum is practically exhausted, setting does not occur. Hydration is promoted by fine grinding, and the reaction of tricalcium aluminate with gypsum is more rapid in a saturated than in an unsaturated solution of lime; consequently, within limits, setting occurs more quickly as a cement contains more tricalcium aluminate, more free lime, and less gypsum, and as it is more finely ground. From records of analyses of commercial cements, these relations do not seem to be very close, for cements low in tricalcium aluminate frequently carry as much gypsum as cements high in that constituent, other things being apparently equal, though actual effective fineness cannot, so far, be measured and recorded. Gypsum may be required to hasten the setting of cements low in tricalcium aluminate and high in tetracalcium alumino ferrite.

Flash set, a quick and progressive development of genuine setting, is due to high content of tricalcium aluminate, or low content of gypsum, or both. False set, a loss of plasticity without corresponding development of hardness or strength, is due primarily to the presence of too much plaster of Paris, but perhaps in some cases partially to a deficiency of gypsum.

False or "hesitating" set may be distinguished from flash set, which is accompanied by a perceptible temperature rise, and passes through stages corresponding to initial and final set within a few minutes, whereas false set (sometimes called "gum" set) appears 10 or 15 minutes after a pat is prepared, and is not followed shortly by final set.

A large number of electrolytes may act as cement retarders, but gypsum is the cheapest reliable retarder.

Soundness

A cement is said to be sound if it contains no constituent that on prolonged exposure to moisture or to five hours in a steam bath will expand with destructive effects on a set and hardened test piece. Free lime seems to be the only constituent responsible for such failures, although sulphides oxidizing to carbonates may be a contributing cause.

Tiny particles of lime, inclosed within grains of cement, and overburned particles of lime not so inclosed, hydrate and expand in the cement paste after setting takes place, unless previously hydrated by the "ageing" of clinker, or by the presence of moisture during the grinding of clinker, or in concrete before setting takes place, as may occur to some extent in very finely ground cement.

Any cement containing less than 1% of free lime is likely to be sound. Some cements may carry as much as 3% of free lime without being unsound. Cements are improved as to soundness by the reduction of particles of limestone coarser than 100 mesh and silica coarser than 200 mesh in the raw mix, by uniform mixing, by not attempting to carry tricalcium silicate too high, and by the thorough burning and fine grinding of the clinker.

Fineness

Fineness is one of the most important qualities of cement because fineness governs both the distribution of cement throughout a concrete mass, and the rate at which and the extent to which it develops a binding agent.

Two highly important properties of concrete are strength and imperviousness to water. Strength depends chiefly on combining such assorted sizes of sand and gravel particles as to leave the minimum of voids, and uniting the particles of aggregates with a strong and highly adhesive binder. As the porosity of concrete is diminished it becomes less permeable to water, and less vulnerable to other destructive forces. No amount of cement is a satisfactory substitute for cleanliness, strength, durability, and proper grading of aggregates, although additions of cement may compensate to some extent for the absence of such qualities.

Only that part of cement which hydrates produces a binding agent, and only that part of the binding agent which comes in contact with aggregates serves any purpose in concrete, except as a void filler, which purpose

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can be served equally well by inexpensive aggregate.

Hydration necessarily begins at the surface of the cement particle and it penetrates very slowly—one fifty-thousandth of an inch in 24 hours, and one fifteen-thousandth in seven days. Three facts are apparent from this: first, that the quantity of adhesive binder developed at early stages is substantially a direct function of the cement surface exposed; second, that the distribution of the binder over the surface of the aggregates is chiefly a function of the number and smallness of the particles of cement present; and, third, that plasticity of cement pastes may be due more to a large number of fine particles than to a large exposed surface of the cement present.

An attempt is made to indicate the fineness of cement by giving the percentage of it which passes through (or remain on) a standard No. 200 sieve, the clear openings of which are 0.0029 in. sq. In effect, this means that the percentage allowed on the screen will certainly be useless except as aggregate, and that all that will pass through might be useless, for cement not containing much material far below the 200-mesh size will not develop much strength. The test of a cement on a 200-mesh screen should be regarded as only a rough indicator, not as a measure of quality. The test has really little or no value (and is a considerable nuisance) except within the cement plant, where it is used as an indicator of physical conditions, just as litmus paper or phenolphthalein is used as an indicator of chemical conditions.

There is no practical measure of the effective fineness of cement. The range of sizes is too great, corresponding roughly to that between 1/16-in. sand and 2-in. gravel, and the particles are too small, ranging downward from $\frac{3}{1000}$ of an inch toward $\frac{1}{10{,}000}$ of an inch.

Not much is known of the sizes and assortments of sizes of the particles that are necessary or desirable in good cement. They cannot be determined by sieves, but many efforts have been made through the use of elutriation and settling schemes, which are tedious, expensive, and productive of only rough determinations.

In dealing with such minute things as cement particles, the micron (0.001 millimeter, equal to 0.00003937 in. or about one twenty-five thousandths of an inch) is used. Of a modern cement, 20 to 25% may be below the 10 micron size, 35 to 40% below 20 microns. 50 to 60% below 30 microns, 70 to 80% below 43 microns (325 mesh), and 80 to 93% below 74 microns (200 mesh).

Fine grinding contributes to quick setting, soundness, early strength, plasticity, density in concrete, strength in lean concrete, and to lightness in color.

(To be continued)

"Unevenness" of Grinding Cement Held Responsible for Pavement Cracks

THE necessity for a uniform grading of cement particle sizes is suggested in "A Study of Shrinkage Cracking on a Concrete Road in Ohio," by H. P. Chapman, chief engineer, and R. C. Sloane, research engineer, Ohio State Highway Department, in a recent report to the Highway Research Board of the National Research Council, Washington, D. C.

The report describes an investigation into the causes for the radically different influences of two different cements upon the formation of early shrinkage cracks and a method used for correcting the bad condition in the case of the cement showing the poor results. Numerous shrinkage cracks developed in the concrete containing Cement A, while none were apparent in the concrete in which Cement B was used.

A peculiar condition under which the cracking occurred in the case of Cement A was an early partial initial set, followed by a 30 to 45 minute dormant period, after which the setting proceeded rapidly. It was apparent from the chemical analyses that differences in the constitution of the two cements could not account for their different behavior under similar construction conditions. However, the appearance of the two cements under the microscope was radically different. Extreme unevenness of grinding in the Cement A was apparent. A pen sketch of the two cements as they appeared when magnified is included in the original report. Cement B which produced no shrinkage cracks showed uniform grinding with no excessively fine and coarse particles while Cement A was shown to be one-third coarsely ground and one-third excessively fine with few particles having the same appearance as Cement B. The fine particles in Cement A looked very similar to the particles in high early strength cements. In other words Cement A appeared very much like a mixture of high early strength cements with relatively coarsely ground cement. This is a condition favorable to the rapid hydration and setting of the extreme fines with a lag in the hydration and setting of the coarser particles as observed on the project. It was found that the early shrinkage with Cement A could be prevented by the admixture of calcium chloride. This effect is ascribed by the authors to the acceleration in hydration of the coarser particles caused by the salt.

The following table summarizes the results on 150 lin. ft. of continuous pavement placed in the afternoon on a 5.2% down grade. The entire 150 ft. were given ample and similar curing protection.

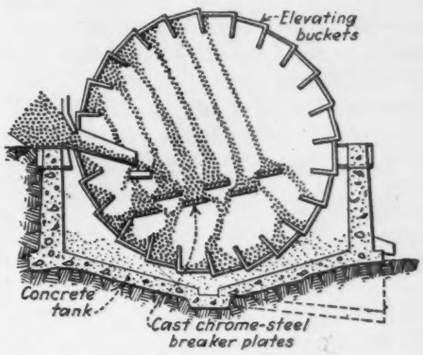
Section	Length (Ft.)	Brand of Cement	Number of cracks	Admixture
1	20	A	16 (Separation cracks)	None
2	40	B	1 (Short shrinkage crack)	None
3	20	A	23 (Separation cracks)	None
4	60	A	None	1 lb. $CaCl_2$ used for each sack of cement
5	10	A	8 (Separation cracks)	None

The report also includes other interesting information on cracking, such as (*a*) late screeding seemed to fill up and remove the cracks; (*b*) cracks were almost entirely absent when pouring upgrade; (*c*) cracks were more numerous on downgrade and superelevated curves; and (*d*) proper attention to curing would reduce the number of cracks but would not eliminate them.

Novel Grinding Mill

THE Hadsel gravity mill, described in a recent issue of the *Engineering and Mining Journal,* uses the principle of the ball mill.

The mill proper is 24 ft. in dia. and very short, more like a disk than a cylinder. It has buckets 3x3 ft. inside that lift the material as shown in the cut. From the buckets the material falls on chrome steel breaker plates which are fastened to the walls of the concrete tank in which the mill is hung.



Hadsel gravel mill

The tank has water flowing through it to wash out the fine material and in this way the size of the product is regulated.

R. G. Hall, of San Francisco, recently reported on this mill. He found a saving of power over that required for a crusher and ball mill in series to produce the same product. The Hadsel mill will take a feed up to 12 in.

The steel consumption is estimated at 0.5 lb. total, which includes wear on bucket lips, buckets and breaker plates. The power used, crushing to 3% on 60-mesh and about 65% through 200-mesh, was 6.7 kw.-hr. per ton. The water used per ton was 1500 gal., and the repairs other than steel are estimated at 1c. per ton per annum. The data are taken from the performance of a mill at the Beebe mine near Georgetown, Calif., crushing ore said to be above average hardness.

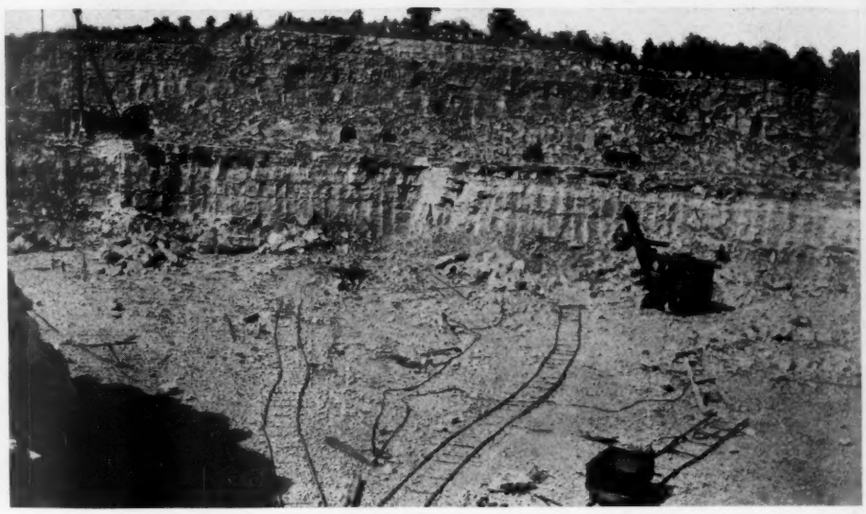
Crushed Stone Plant of Moderate Size With Unusual Features

Cerulean Stone Co., Cerulean, Ky., Has Dust-Collecting System and Uses Diesel Engine Power

ALTHOUGH in general quarrying and crushing methods are pretty much the same, they differ somewhat at every quarry and there is usually some particular feature that distinguishes one operation from another. This may be in the method of quarrying the stone or in the handling of it or in crushing it, but somewhere along the line the distinction will be found. The particular feature of the plant of the Cerulean Stone Co. at Cerulean, Ky., is its installation of dust-collecting equipment, although the methods used in the rest of the plant are also interesting and well worth reviewing.

This plant is located in western Kentucky in a district where crushed stone operations are not uncommon. It has a capacity of about 20 cars per day and is a steady producer. The top of the limestone deposit is at a level above the crusher house, but because of the depth of the working, the stone has to be brought up an incline to the primary crusher. Little stripping is necessary, but clay pockets in the upper strata make it necessary to use care in getting out the top stone.

Hand drills are used on the upper strata and the rock is shot with small charges of powder. The good rock is then removed and the balance is wasted with the strippings. Below this upper strata is a 40-ft. ledge of good stone extending down to the lower ledge. The lower ledge is about 20 ft. in depth and is a good fine-grained limestone.



View showing the two ledges of the quarry

For drilling, an Ingersoll-Rand X-71 wagon-mounted air drill is used on the upper ledge. On the lower ledge a Loomis "Clipper" well drill is used, drilling 5-in. holes. About 40 of these holes, in two rows, are shot at a time. The holes are drilled on about 12- to 14-ft. centers and the two rows are staggered.

At the lower level a Lima 101 caterpillar-type electric shovel equipped with a 1¼-yd. dipper is used for excavating and loading to quarry cars. On the upper level hand labor is used for loading. This is not so much because it is cheaper but to give employment to the men, many of whom are old employes of the company and are practically dependent on this work. The men get about 30c. per 2-ton load and can load from six to ten loads in a day. The cost to the company is about the same as it would be with shovel loading. A ¾-yd. Speeder shovel is also used on the upper level for some of the loading and for reclaiming from stock piles.

Quarry car being dumped to the primary crusher. Note absence of dust in the plant

Narrow-gage track units with steel ties which are light and easily shifted are used in the quarry. Mules are used to move the cars to the foot of the incline and from there they are pulled up to the primary crusher by a cable and friction hoist which is driven directly from the main line shaft of the plant.

The quarry cars are of the end-dump type and are automatically dumped to a 15-in. McCully Superior gyratory crusher. The crushed rock is then carried up by a 24-in. bucket elevator to a revolving scalping screen. The rejects from this screen fall to a 3-ft. Symons cone crusher located alongside the primary crusher and the throughs pass to a 4- by 6-ft. "Plato" double-deck vibrating screen where the final sizing of the stone is done and from which the sized material falls to bins below.

The material discharged from the Symons crusher falls to the same bucket elevator and is returned to the scalping screen, thus forming a closed circuit in which all of the

End view of plant showing V-bottom bins

stone is reduced to the desired size before going to the sizing screen.

A Kent mill is used to reduce the fine material to a suitable size for sale as agricultural limestone. This mill is located on the ground floor in a separate building alongside the main plant and is independently driven by a 50-hp. Fairbanks-Morse motor. A small bucket elevator takes the pulverized product of the mill back up to the vibrating screen for rescreening.

Although the plant was constructed about 1920, the present dust-collecting equipment was not installed until about five years ago.

The installation, which was furnished by the Clark Dust Collecting Co., Chicago, Ill., is arranged with four large intakes for collecting the dust: One at the primary crusher; another over the secondary crusher; a third over the screen, and the fourth over the pulverizer. From these intakes the dust is drawn up to a collector from which it is deposited in a large overhead bin. From the bin it is drawn and sacked in paper bags and is sold under the trade name of "Sweetland." Normally a considerable amount of this agricultural limestone is sold to the farmers in the surrounding country. Although dust cannot be entirely avoided in its manufacture, this dust-collecting installation has reduced it to a minimum and has made the plant a much better place in which to work.

Another feature of the plant is the use of Diesel oil engines to supply practically all the power needed for the entire operation. The main plant is run by a 4-cyl., 200-hp. Fairbanks-Morse Diesel engine which, through a line shaft, drives the crushers, quarry hoist, bucket elevator, rotary screen and dust-collecting system.

A smaller Diesel engine located in the same engine room drives an Ingersoll-Rand air compressor and a Fairbanks-Morse generator, the latter supplying electric current for the vibrating screen and for two or three other motors around the plant. The smaller engine is a 2-cyl., 100-hp. unit, also of Fairbanks-Morse manufacture.

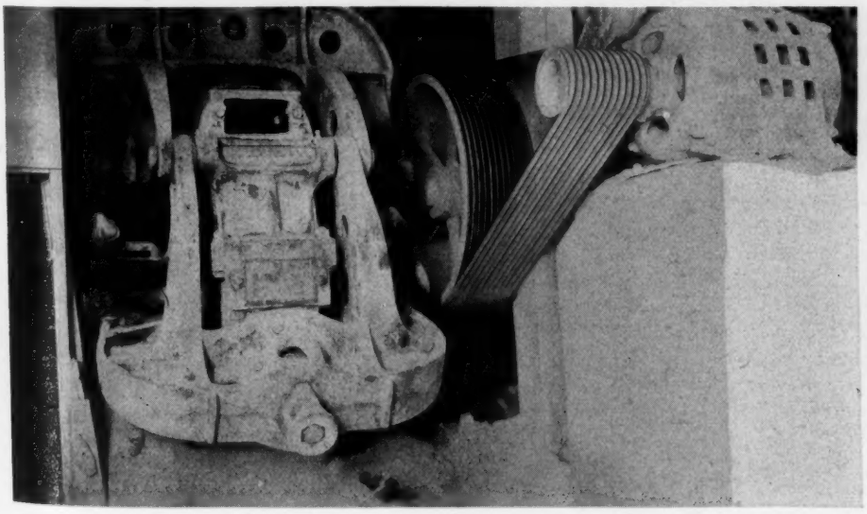
It is estimated that the 200-hp. engine requires about 12 gallons of fuel oil per hour, which, at a cost of 5c. per gallon, amounts to 60c. per hour. The unit also consumes about ½ gallon of cylinder oil per hour.

In the quarry a small centrifugal pump driven by a 10-hp. Fairbanks-Morse motor is run intermittently to keep down the water in the quarry.

The plant is of timber construction covered with corrugated iron. The seven loading bins all have V-shaped bottoms to insure ready cleaning of the bins. Loading is either direct to railway cars or to trucks from the same bins. The cars are handled at the bins by a car puller made from an old hoisting engine and are weighed over a 100-ton capacity Fairbanks track scale.

Collector above the dust bin

J. L. Nicholson of Henderson, Ky., is president of the Cerulean Stone Co. and N. Powell Taylor, also of Henderson, is secretary and treasurer. Ben Nicholson is the superintendent at Cerulean.



Pulverizing unit for producing agricultural limestone

Concentrating Fluorspar

INFORMATION circular No. 6621 of the U. S. Bureau of Mines describes the concentration of fluorspar at Hillside Mines, Rosiclare, Ill.

Fluorspar is difficult to separate from the calcite, limestone, sandstone and chert with which it is found. Its specific gravity is 3.2 and that of the other minerals 2.8 to 2.9. This difference is very small for making a satisfactory separation by gravity. Some lead is present and this has to be taken out as a separate product. The ore is mined underground, washed over a screen and crushed to ¾ in. and finer.

This ¾-in. material is fed to jigs of the Richards and Harz types. In order for the jigs to do good work the feed has to be carefully sized. The flow sheet shows four revolving screens with ⅜-in., ¼-in. 4-mm. and 3-mm. perforations. Finer materials than 3-mm. are treated on tables and a tailing section treats the rejects in a Hancock jig and a Harz jig, which cleans the Hancock jig concentrate. Fine material which is beyond the scope of water concentration at present is being saved in ponds.

The feed averages: CaF_2 48.69%, $CaCO_3$ 44.87%, SiO_2 5.59%. The tailings formerly ran around 26% CaF_2 and the recovery was only 50.8% of the fluorspar in the ore. Since the tailing section was put in the recovery has increased to nearly 80%. The Hancock jig is operated to produce a clean tailing and a rough concentration and no trouble is experienced in cleaning this concentrate in the Harz jig up to the required 85% CaF_2. In fact it often runs 90%.

Dust Hazard in Rock Products Industry

Only Dusts Containing Silica Are Dangerous—Digest of Papers and Discussion at the National Safety Congress

THE RECENT National Safety Congress at Washington, D. C., included a symposium on the dust hazards to health in industry, a subject of particular interest to some rock products producers at this time because of the activity of a certain type of lawyer in promoting lawsuits for damages, running (in the aggregate) to millions of dollars.

Dr. Leonard Greenburg, Yale University, New Haven, Conn., presided as chairman. The first paper by Dr. L. U. Gardner, director of Trudeau Laboratory, Saranac Lake, N. Y., dealt with the kinds of dust encountered in industry and their effect upon the lung tissues. The second paper by J. J. Bloomfield, U. S. Public Health Service, Washington, D. C., followed with a discussion of the methods of determination of dust as to particle size and concentration in the air. The third paper by Dr. A. E. Russell, U. S. Public Health Service, Washington, D. C., discussed clinical and statistical studies in various dusty trades. In the fourth paper, Theodore Hatch, of the Harvard School of Public Health, Boston, Mass., discussed the various methods of dust control in industrial plants, and in the fifth paper, Prof. Philip Drinker, Harvard School of Public Health, outlined the various methods for protecting the worker against dust inhalation.

Dr. L. U. Gardner said in part: "At first it was thought that all dusts were capable of producing disease, but with further study it became obvious that different types of dust produced different effects. With further study it became obvious that dusts containing silica were particularly harmful and that they produced definite changes in the lung tissues. Today we recognize silicosis as a form of disease which is quite definite. There are other forms of changes in the lung tissues which are produced by the inhalation of dust about which we know little.

"We know many of these dust conditions are associated with a factor of infection in the lung. Some believe that silicosis can not exist without a background of latent infection. However, this is an extreme view, as we know we can produce experimentally a true silicosis in animals by the inhalation of silica alone.

"Much has been written about coal miners and the factor of infection due to inhalation of dust. Pneumonia rates are excessive among coal miners, but probably the tuberculosis rate is lower than in other industries. This seems to end with different groups, and much more work must be done before we can talk definitely.

Lime Dusts Not Injurious

ROCK PRODUCTS took an active interest in the dust problem in its industries as early as 1921, when the editor heard from various producers that lime and limestone dust had been regarded in the industry for generations not only as not harmful, but actually helpful in the treatment of tuberculosis. In the January 14, 1922 issue is a 6-page article on "Lime and Tuberculosis" containing a symposium of the experience and opinions of numerous lime manufacturers and a summary of existing literature on the subject.

The subject has been continuously discussed in Rock Products since that time. In the June 28, 1924, issue is a 5-page article on the use of both lime and gypsum dusts as possible preventives and cures for tuberculosis. These articles received wide notice and Dr. Miriam Iszard was led to make her thesis for her medical degree at Johns Hopkins University on the subject. Her conclusions were not very specific as to the effect of these dusts as cures or preventives, but were quite definite that lime and gypsum dusts were not causes of tuberculosis, or silicosis, as are dusts containing silica.

In the course of these 10 years Rock Products collected and published much information in regard to experience and experiments with lime, limestone and gypsum dusts which should be very helpful to any producer faced with lawsuits as a result of alleged injury to health due to exposure to these dusts. The great preponderance of evidence is that the "lime salt" dusts are dissolved in the lungs and provide calcareous material to heal the lesions of tuberculosis.—The Editor.

"All dust, when inhaled, mechanically injures the lung tissues, and the small particles injure the cells. We know that the type of injury varies with the nature of the dust particle."

Dr. Gardner showed a number of lantern slides illustrating the effect of dust on the lung tissues: "If coal dust is present in excessive quantities and silica in relatively insignificant amounts, we have a distribution which is comparable to that of pure coal. If silica is in excess and coal not abundant, we have a nodular type similar to silicosis.

"As far as asbestos is concerned, we do not know the whole story. An autopsy report of an individual dying of asbestosis has shown a tuberculosis complication. Until we have more statistics of people working in asbestos dust we should not say too much about the part played by tuberculosis in association with this condition."

Analyses of Mineral Industry Dusts

J. J. Bloomfield said in part: During the past nine years he had made numerous investigations of the dust hazard in many industrial establishments. He presented a summary which showed that the highest dust exposure was in talc mines, slate finishing mills, quartz (silica) grinding plants, coal mining and granite cutting operations. Owing to the high percentage of silica present in the dust of quartz grinding and granite cutting plants he found these to be the most hazardous of the occupations which he had studied.

"A knowledge of the dust content of the industrial atmosphere is required," said Mr. Bloomfield, "not only for the purpose of determining the extent of the hazard involved in various manufacturing processes, but it is also useful in measuring the efficiency of protective devices which may be used in the elimination of the dust hazard."

In discussing the health hazard, he said: "It is now well established that the inhalation of certain types of dust, such as granite dust, will in time produce fibrosis of the lungs, at times associated with tuberculosis. In other cases exposure to dust may result in the production of a far less degree of fibrosis without notable tendency toward subsequent tuberculosis; this is true of cement dust. And finally, there are certain types of dust as typified by marble dust, which in the quantities and lengths of exposure so far observed produce little lung fibrosis. In general it has been found that those dusts which are high in silica content are the ones which produce a disabling fibrosis of the lungs most readily. Hence, the necessity for knowledge concerning the chemical and mineralogical composition of a dust is obvious.

"With reference to the quantity of dust present in the air of a workroom, it is apparent that when the dust concentration is high the exposed person will inhale a greater quantity in a given period of time than he will when the dust concentration of the atmosphere is relatively low, and since the rate of production of the disease is partially dependent upon the rate at which the dust is inhaled, this latter fact plays an important role in predicting the relative danger of different environments. Hence the need for the evaluation of the quantity of dust in the industrial atmosphere is obvious.

"In general, it has been found that the harmfulness of a quartz-containing dust is in direct proportion to its quartz content. For this reason, in attempting to evaluate the harmfulness of a dust, it is of the utmost importance to ascertain its exact mineralogical composition. It has been our experience that to determine accurately the exact mineralogical composition of a dust one must resort to a combined chemical and petrographic analysis. It is our practice to have such an analysis made by an expert in petrographic geology."

Dr. Bloomfield displayed a table which indicated the percentage of quartz content of dust obtained in the various industries which he had studied, as follows:

Rock drilling dust (bituminous coal mine)	54.0%
Granite cutting dust	35.2%
Rock drilling dust (anthracite coal mine)	31.0%
Brass foundry dust	19.0%
Dust from raw mills in cement plant	6.5%
Slate mill dust (Vermont red slate)	3.0%
Silverware polishing dust	1.7%
Anthracite coal dust	1.5%
Bituminous coal dust	1.2%
Cement dust	1.0%
Slate mill dust (Vermont green slate)	trace
Talc mill dust	none
Marble cutting dust	none

"It is evident," said Dr. Bloomfield, "from this table that rock drilling occupations in the coal mining industry and certain occupations in the granite cutting industry and in brass foundries would be in the hazardous class as judged by the proportions of quartz in the atmospheric dust."

Silica Dust the "Arch Offender"

Dr. A. E. Russell said in part: "The dust which produces the greatest damages are inorganic dusts, and silica is the arch offender. I have seen workers in dusty trades where silica is almost absent. Exposure to dusts will produce fibrosis of the lungs. A statement recently appeared in the 'Cement Bulletin' that fibrosis in one case is not comparable to another.

"I have visited marble workers. The men are apprenticed, going into the industry for a life work. I was anxious and very glad to see this group of workers. Dust counts revealed that marble workers are exposed to a smaller amount of dust than granite workers. We found that quite a number had more fibrosis than usual. Some had signs of tuberculosis. Dr. Rogers of Vermont State Sanitarium stated that he did not have marble workers as patients at his hospital unless they had previously worked in granite. We found no active cases of tuberculosis among this group in the marble industry.

"Considering silica, it has been my experience that one of the first and last complaints is that it shortens the breath. A patient described it to me recently, saying that he had lost his second wind and did not have the usual reserve. Tuberculosis complicates the cases in the various stages. A child can not live around an adult case without being infected. They developed silicosis much more rapidly than those who did not have this infection.

"Silicosis is one of the foremost diseases. People all over the country are worked up over it. Many cases are coming before the juries. I believe in time they will have to subsidize hospitals in the larger cities and in most manufacturing cities. Diagnostic service should be provided. This proposition of submitting the evidence to lay juries is dangerous."

Dr. Russell then presented several slides showing the results of coal, slate, marble, cement, asbestos and granite dusts on lung tissues.

Physical Examination of Employes Necessary

Theodore Hatch said in part: "The health hazard associated with exposure to industrial dusts varies with the industry and depends upon a number of factors, chief of which are the physical characteristics of those exposed, the chemical and physical properties of the dust, and its concentraton in the atmosphere of the work places.

"The evaluation of the hazard in a given industrial plant must therefore be based upon a thorough investigation of the factory conditions and a careful interpretation of the results. The investigation should include physical examinations of the men and a study of morbidity and mortality statistics, chemical examination of the dust, and determinations of its physical properties such as particle size.

"The most direct means of controlling the hazard is by reducing the dust concentration to which the workers are exposed. The efficiency of the required dust control depends upon the allowable concentration in the atmosphere, which in turn is determined by the toxicity of the dust and the tolerance of those exposed. The standard of permissible dustiness may be increased by careful selection of the men, by means of physical examination, and limiting their exposures through a system of rotation of employment. It may be further increased by reducing the percentage of toxic material in the dust and otherwise controlling its chemical and physical characteristics.

"In the absence of definite knowledge, the safe course is to consider all dusts dangerous until proved innocent.

"The dusty processes encountered in industry differ widely and exhibit a considerable variation in the restrictions placed upon the design and operation of the devices for the control of the dust. No single method of control can be universally applied; on the contrary a number of methods have been developed to meet the needs of the dusty trades and the choice of method must be based upon a thorough study of local conditions. The common methods follow:

"Substitution of Non-hazardous Processes: The silicosis hazard has been reduced in a number of industries by substituting for the dusty process one which is dust-free or which produces a relatively harmless dust. In the granite industry the surfacing machine, a heavy dust producing tool, has been replaced to some extent by the gang saw and the artificial abrasive wheel. These are wet processes and have reduced the dust concentration associated with the surfacing of the stone to a figure well below the hygienic face limit.

Control of Dusty Operations

"Isolation of the Hazardous Process: It is possible to isolate the dusty process in many cases. This may consist merely in confining the hazardous stages of manufacture to a separate building or room, thereby reducing the number of men exposed to the dust (and these men may be protected by masks), or it may mean complete isolation from the workers in an enclosed space.

"General Ventilation: In a few instances of generalized dust production throughout the factory the use of general ventilation may prove satisfactory as a means of dust control. Under such conditions the introduction of large quantities of dust-free air serves to reduce the dust concentration by simple dilution. This method is used in certain mining operations, also for purposes of removing heat and toxic gases as well as dust. In general it involves the installation of large fans and is expensive to operate. This method should be looked upon as an adjunct to other methods of control rather than an independent method.

"Control of Dusts at the Origin: Effective control of the dust at the point of generation prevents it from reaching the breathing zone of the worker and hence offers a positive means of reducing the dust hazard. It may be effected by the use of water or other liquids for capturing the dust or by means of local exhaust ventilation. The use of water for laying dust is an old method of control. It undoubtedly reduces the dust concentration, but investigations have shown that it does not always give the high degree of protection required. Local exhaust ventilation consists in removing the dust through a suction hood placed close to the point of generation. This method of control is widely used in industry and is most effective when applied to a stationary dust-producing machine or when it is attached to a moving tool, thus keeping it at a fixed distance from the point of dust origin. Its general application has been recognized and most states have incorporated specifications for the design of local exhaust systems in their industrial code."

Protective Devices for Workers

Prof. Philip Drinker said in part: "Painful as the cure may be, it consists of two perfectly definite steps: (1) Medical examinations of new employes and routine examinations of all persons exposed to dangerous dust concentrations; and (2) reduction of dust concentrations breathed by workers to what are considered to be safe limits.

"If dustiness can be controlled by local exhaust fans and dust-collecting equipment, protective devices such as respirators or positive pressure helmets have no place except as emergency equipment. However, many processes like abrasive (sand or steel) blasting, paint and enamel spraying, porcelain manufacture, stone cutting, sand grinding, and the like, will not, in all probability, be made reasonably dust free for some years to come. In work of this type, respirators and other protective devices have an important place. The safety man should understand thoroughly what can be expected of protective devices and, above all, should be able to check and observe whether the workmen are getting the protection they require.

"One sees occasionally statements to the effect that respirators have no place in industry because they filter out only large particles and let pass the small ones which are always the more harmful. Against this is the indisputable fact that the dust catching efficiency of several makes of respirators exceeds 90% on silica dust with particles less than two microns. A careful measurement of the size of dust particles entering and leaving respirators shows a slight but unimportant reduction in average size of the dust particles."

Professor Drinker reviewed the specifications for respirators which have been formulated by the U. S. Bureau of Mines and paid glowing tribute to the high caliber of its work and its importance to the safety movement. Also he outlined the requirements for testing sand blast helmets and paint spray masks.

"The manufacture of protective equipment," he said, "should be allowed all possible license in modifications and improvements having to do with appearance, obstruction to vision, comfort, ruggedness and practicability of his equipment. If the manufacturer desires his product to be certified as to its performance under the conditions for which he designed and built it, the prospective purchaser and safety engineer is equally desirous of knowing the performance data."

Discussion

Discussion was withheld until all papers were read. Chairman Greenburg then called upon various people for comment. Following this the meeting was thrown open for general discussion and then the original speakers called on for replies.

Dr. Pancoast, pathologist, University of Pennsylvania, said in part: "I have been interested in silicosis for a number of years. We have the very best way of finding out what changes are taking place in the lungs by x-rays. There can be no dispute to that question. We also have one of the best ways of determining the incapacity of the individual, but most of these examinations are not carried out thoroughly and the information is not given. The x-ray examination is only one small part, and that is something that is overlooked so frequently. A physician who has little knowledge of the subject will present x-ray pictures—and diagnose silicosis as the cause! It takes all of the ability of many witnesses who know something about the subject to counteract the few words he may say. Many here know that. We must know the kind of dust, dust counts, chemical constituents of the dust, clinical aspect of the case, time of work, how long he works each day, whether he is breathing the general atmosphere of the room or a more concentrated atmosphere. Previous occupation is often overlooked. All of these different sides to the question must be taken into consideration in every instance in which a man is charged with lack of capacity for work."

Dr. McConnell, Metropolitan Life Insurance Co., said: "Dr. Russell made a very important point in calling our attention to the necessity of having authority to decide cases. This is a matter of considerable interest to the meeting, and much thought should be given to it."

Mr. Cunningham said: "The whole situation has been presented very thoroughly. Two things have occurred to me: (1) Those stone cutters who have cut limestone for 15 or 20 years and who have tuberculosis, in each case have cut sandstone previously. Whether a short exposure a long time ago is important 20 years later is important. (2) Examination of workers who have been exposed simultaneously to silica and alkali. Reports have been made showing silicosis may develop rapidly. I am interested in the presentation of the situation regarding the control of dust because it is the real problem ahead of us."

Dr. Lloyd, U. S. Bureau of Standards, said: "Dr. Drinker told us how they test the respirator and pointed out the impracticability of using positive air pressure as a dust eliminator. A definite opinion is desired as to what type of respirator is adequate under bad dust conditions and within acceptable operating limits for protecting a man."

Dr. Drinker: "I certainly do not consider respirators adequate under such circumstances. Supposing you have a dusty atmosphere of, say, 50,000,000 count and you want to reduce it to 20,000,000. If your respirator is 90% efficient it would get the dust concentration down to 5,000,000, but eight hours a day constant use will be objectionable. In jobs in places like foundries, mines, sand blasts, etc., the exposure is not continuous. In such cases the respirator is not worn continuously."

Dr. Knutsen, Wisconsin Industrial Commission, said: "Two or three of the speakers made mention of the decision of claims which are made as the result of men becoming incapacitated in working in dusty occupations.

"This, to me, has been one of the most interesting sections I have attended in over 10 years of Safety Council meetings. The problem of silicosis and tuberculosis has been before us in Wisconsin since 1917, because of the fact that at that time our compensation law was amended providing compensation benefits for any disease or disability resulting from an occupation. I appreciate that one or two states have such provisions. I suggest one way of deciding a case is to have compensation laws amended covering all diseases of occupations so that claims may be decided by the industrial commission rather than by juries as the result of civil claims being filed.

"I will relate briefly difficulties we have. I do not wish to make a statement reflecting on the medical profession. The difficulty is this: Oftentimes a claim is presented to us for compensation by some individual because of a disability allegedly resulting from silicosis. In many of those cases we have members of the medical profession testify in behalf of the clients, who we personally are satisfied are not specialists or competent along those particular lines. The discouraging thing to us is that in hearing the evidence we have men before us who have specialized for years in lung diseases, men who are engaged in private practice and are at the head of tubercular institutions, testifying one group on one side, that the results of physical findings and x-rays show that the patient is disabled as a result of silicosis. Others equally qualified testify to the contrary. We have had some of these cases when we heard testimony and the individual didn't have long to live. We withheld our decision until the individual passed away and suggested an autopsy. We can not force an autopsy, but we are privileged to withhold our decision. After the autopsy, these two groups of doctors take specimens, examining them microscopically, and we hear them taking the same position that they had in the first hearing. That, I want to say, is mighty discouraging."

Dr. Roach, compensation commissioner for the state of New Jersey, said in part: "I am very much interested in the subject, because silicosis is a thing that we are very much concerned about in New Jersey at the present time. I might say that we have some experience in compensation cases in the state parallel to that described by Commissioner Knutsen from Wisconsin. It doesn't require much evidence to prove that certain quantities of silica are harmful to the human system. After an exposure continuous over a period of time long enough, permanent physical damage is bound to result, maybe to the point of the extinction of the individual. There are certain things that I am very much concerned about in connection with this subject of dust. To find some workable productive device that will safeguard the men who are exposed in 60 or 70 different industries to silica dust. It is not easy. It may be that in the laboratory ex-

periments, under rather favorable conditions, a piece of apparatus may be developed which is satisfactory. Respiratory devices that might be good on some may not work so well on others."

Dr. J. G. Cunningham, commissioner of hygiene, Toronto, Ont., said in part: "Many cases in mining come from physicians when examining miners for employment. All cases are referred to a compensation board. When the claim is received by the board it makes its arrangements to insure that all other requirements of the act have been met. In Ontario a miner must be exposed for five years. Other occupations have various exposure time limits. After these provisions have been met the cases are referred to a referee board, which is composed of three members, two of whom must see the case and complete the examination. Decision must be unanimous, and is final, and the claim is referred back to the compensation board."

Dr. Russell: "Dr. Cunningham spoke of finding among his limestone workers that they had worked in sandstone years before. If you will remember in the 'Granite-Cutting Bulletin' the death rate for manufacturers was almost equal to that of granite cutters. In most instances he (the manufacturer) was not exposed to dust. He did not work at it eight hours a day. The story is that the majority of manufacturers started out and learned the stone business by being granite cutters.

"In these days of law suits it is surprising how quickly experts can develop. I think commissioners and their boards should pay more attention to the qualifications of their experts."

Dr. Sayers, U. S. Public Health Service, said in part: "I have in mind two cases. The men both had silicosis and tuberculosis for 19 years. Both of them are still at work. We have examined them periodically right along during the period. They are not in good condition, but they are at work. I do not believe we are in a position to say whether a man has susceptibility to tuberculosis. Throughout the time the information was available, it looks as though susceptibility to tuberculosis continues for at least 20 years."

Dr. Lawrence Greenburg: "Will someone say something regarding the so-called acute cases of exposure? Most of us have the idea it is a matter of long gradual exposure."

Dr. Russell: "Acute silicosis is a problem that is facing industry. I personally can not think of silicosis as anything but chronic, my first experience being with granite workers. One case of silicosis had eight months' exposure. In a tuberculosis sanitarium the superintendent was kind enough to give me an x-ray. It is sometimes impossible to demonstrate physically or with laboratory evidence a case of active tuberculosis. In *The Journal of the American Medical Association,* an article by Dr. Chapman of Boston tells of exposure extended to three years. They were considered as acute cases."

Management of Labor in Mining Operations

HOW some of the mining companies have developed efficient organizations is described in Information Circular 6650, "Management of Labor in Successful Metal Mine Operations," recently published by the U. S. Bureau of Mines.

This 35-page bulletin summarizes the data contained in some 80 information circulars on individual mines and discusses the advantages and disadvantages of various systems of paying and handling labor.

Since the cost of labor is more than 60% of the cost of mining, the development of efficient, willing workers is of the greatest importance. Organization, responsibility and planning are also discussed. According to the circular, 40% of the mines described operate entirely on a contract or bonus system, 44% operate partly on contract or bonus and partly on a day wage basis, and 16% operate on a day wage basis.

Increasing Cement Kiln Output

THE use of chains in the feed end of a wet process cement kiln is described in an article by E. Schirm in the September issue of *Cement and Cement Manufacture.*

The first of the accompanying illustrations shows an arrangement of chains to effect heat transfer and to expedite the passage of

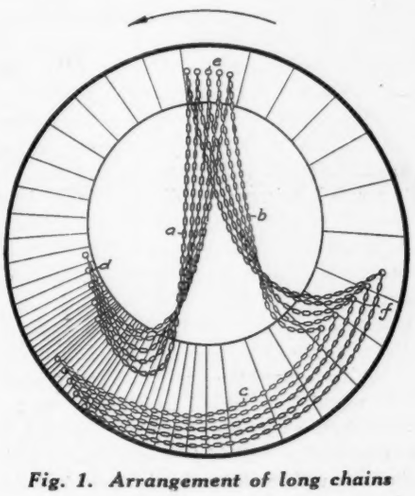


Fig. 1. Arrangement of long chains

the material along the kiln. The chains are attached in groups (three groups only being shown in the illustration) in a spiral formation, the curtain of hanging chains forming a spiral surface which moves the material forward as the kiln revolves. This arrangement gives a good exchange of heat between the gases and the material.

The second illustration shows another arrangement where short heavy chains are used. They are hung in spiral formation so that they may move the material along the kiln more effectively, but the greater part of the kiln section is left open so that there is not as much transfer of heat. However,

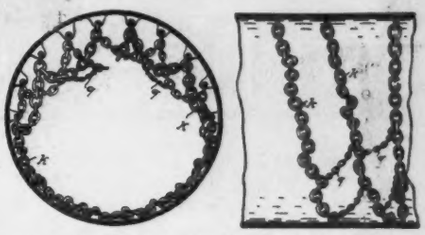


Fig. 2. Arrangement of short chains

it is stated, the long light chains can be used along with the short heavy chains, or each kind can be used in alternate zones.

The article states that the use of chains and other devices in the upper zones has considerably increased the output and that it has been found that the clinkering zone can readily handle more than the normal quantity of material which would pass through a plain kiln.

It is also stated that the radiation loss from a kiln depends upon the shell dimensions rather than the amount of material passing through and that the loss per unit of output is reduced by working at higher capacity. These methods in the wet process and similar methods in the dry process are stated to be an important advance in that one kiln can be made to do the work of two.

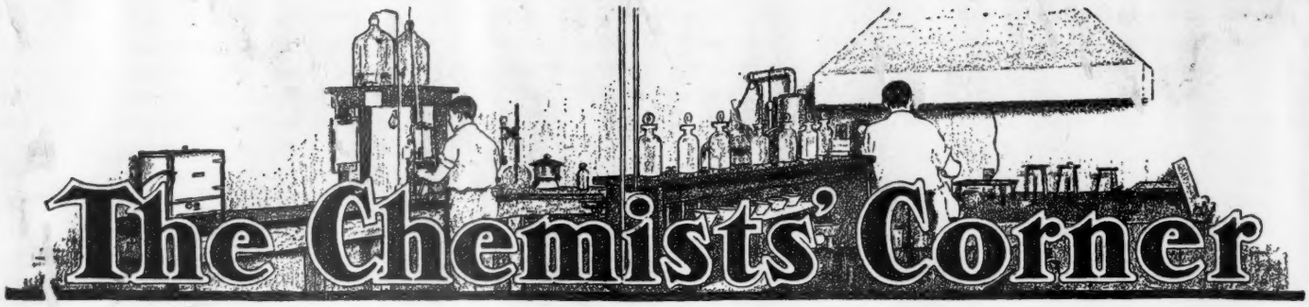
Rubber Sheathed Cables

ACCORDING to the Bureau of Mines there has been a marked improvement in recent years in the construction and performance of rubber sheathed trailing cables used with electrical equipment. While some failures are due to kinking and overheating when on a reel, most are caused by crushing as a result of being run over by a car or being struck by falling material. Crushing tests made by the bureau, using a 7-ton car, indicate that twin or duplex-type cables withstand such crushing better than concentric types.

Full information covering these investigations is contained in a 52-page booklet published by the Bureau of Mines, U. S. Department of Commerce, as Bulletin 358, which may be obtained from the Superintendent of Documents, Washington, D. C.

Canada Asbestos Production

ASBESTOS production in Canada during July amounted to 7171 tons, a decline of 10.1% from the June shipments and 47.3% from the July, 1931, total. During the seven months ending July, Canadian producers shipped 60,753 tons as compared with 93,386 tons in the corresponding period of 1931.



Chemical Analyses of the Particles of Various Sizes of Ground Cement*

By E. T. Carlson and P. H. Bates

A RECENT ARTICLE by Rordam[1] dealing with the question of the effective fineness of cement in relation to its strength-conferring properties is very interesting in one particular feature. This calls attention to the difference in the chemical analyses of the various sizes separated from the cement under investigation. Shimizu[2] also recently called attention to this matter.

The Bureau of Standards has separated five ground portland cement clinkers from as many mills into five fractions by means of air elutriation. These fractions alone and in several blends will be used in studying the question of fineness in relation to the strength of concrete. A description[3] of the equipment used in making the separations and the major portion of the data being obtained will be presented in a later paper. This paper will present only a discussion of the data resulting from the partial analyses of the fractions of the ground clinker.

Table I presents these partial analyses as well as the analyses of the cement used by Rordam and presented in his paper. It also contains the percentages of tricalcium silicate, dicalcium silicate, $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$ and tricalcium aluminate calculated from these analyses. These data reveal in the majority of cases that the compositions of the fractions differ considerably from one another.

The data in the third column show that the finer the fraction the greater the ignition loss. At first thought, this might seem to be a resultant of the absorption of moisture from the air during the air elutriation. In making these separations, however, the air admitted to the system was refrigerated until its relative humidity at 70 deg. was below 20%. Further, through a system of recirculating the air during the elutriation, no more than 20% of outside air was being drawn into the system, the remainder being previously used air. Finally, a calculation of what would be the ignition loss of the ground clinker after the separation, based upon the ignition loss of each fraction and the per cent. of each fraction present in the original ground clinker, showed that in the case of Clinker A (which showed the largest ignition loss of the finest fractions) slightly less than a total of 0.2% had been absorbed by all the fractions during the separation.

A little further thought will show that the materials comprising the ignition loss (water and CO_2 largely) should be present to a greater extent in the finer portions of any ground clinker before any size separation might be made. A gram of a fraction between 0-7 microns in diameter will have approximately a surface of 5000 sq. cm., a gram between 7-22 microns an approximate surface of 1280 sq. cm., and each fraction of larger size will have less surface until a gram of the coarsest fraction in question (75 microns — 200 mesh) has but 160 sq. cm. of surface. Since the water and the carbonic acid would be absorbed undoubtedly to the same depth on the surface of all particles, it can be readily realized how much more ignition loss will be shown by the finer particles of any commercial cement than by the coarser ones.

Most Tricalcium Silicate in Finer Sizes

The analyses and calculated composition of the cement taken from Rordam's paper show very conclusively that the fine size is richest in tricalcium silicate and that there is a decrease in this constituent in each coarser size; that the fine particles are leanest in dicalcium silicate and each coarser size shows an increase in this constituent; and that there is very little difference between the fine and coarse fractions in their tricalcium aluminate or $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$. The analyses of the five brands separated at the Bureau show the same general trend in the case of Brands A, C and E. Brand D is one of the high early strength portland cements characterized by rather lower silica content than usual and containing but a very small amount of dicalcium silicate. As a consequence, this brand could hardly show much variation in the relative amounts of the silicates in any fraction. Brand B, however, is a normal portland cement and why it should show a uniform distribution of the two silicates among the various sized particles cannot be explained at present.

There is to be noted also that the difference in chemical composition between the fraction of least sized particles and that of next larger sized ones is but slight. Indeed, one might conclude there was a tendency for the amount of the tricalcium silicate in the finest size to be somewhat less than in the next larger size. The differences indicated, however, are within the experimental error; very slight differences in the analytical results are very much magnified in the calculations of the components—a 10th per cent. decrease in silica accompanied by a like increase in lime content will result in a 1% increase in tricalcium silicate.

The five clinkers do not show any difference in the fractions so far as the relative amounts of the $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$ compound and tricalcium aluminate are concerned, with the possible exception again of Brand B. Here there does seem to be an indication that the ternary compound is present to a greater extent in the coarser particles and the tricalcium aluminate in the finer particles.

Although these separations were made with lots of ground clinker and not from lots of

*Publication approved by the acting director of the Bureau of Standards of the U. S. Department of Commerce.

[1]Rordam: What is the essential flour in cement? ROCK PRODUCTS, XXXV, No. 15, p. 22, July 30, 1932.

[2]Shimizu: Fine grinding of cement. Review of the Twentieth General Meeting of the Association of Japanese Portland Cement Engineers. Foreign edition, p. 15, 1931.

[3]The apparatus used was designed by L. A. Wagner of this bureau, who also made the separations.

TABLE I. PARTIAL CHEMICAL ANALYSES OF THE CLINKERS AND CALCULATED COMPOSITIONS ON IGNITION LOSS FREE BASIS

Brand	Fraction size in microns	Ignition loss	SO_3	SiO_2	CaO	Fe_2O_3	Al_2O_3	3CS	2CS	4CAF	3CA
		Per cent.									
	Whole	2.4	.....	21.0	65.5	3.7	6.9	55.0	19.0	11.3	12.0
	0-7	6.4	0.19	20.3	65.3	3.6	7.5	58.0	14.5	10.9	13.2
	7-22	2.5	.....	20.4	65.8	3.5	7.1	60.0	13.0	10.6	13.0
"A"	22-45	1.5	.....	21.2	65.5	3.6	7.2	52.0	21.5	10.9	13.0
	45-75	1.1	.....	21.1	64.8	3.7	7.4	49.0	23.5	11.3	13.2
	75*	0.9	0.11	21.1	64.4	3.7	7.5	47.0	25.0	11.3	13.5
	Whole	1.3	.....	22.0	66.2	2.5	6.6	60.0	17.5	7.6	10.9
	0-7	2.8	0.44	22.0	66.2	2.1	6.4	62.5	16.0	6.3	11.4
	7-22	1.2	.....	22.3	66.5	2.2	6.5	59.5	19.0	6.9	11.4
"B"	22-45	0.7	.....	22.2	66.0	2.6	6.0	63.0	16.0	7.9	9.0
	45-75	0.6	.....	21.6	65.6	3.0	6.7	61.0	16.0	9.1	9.8
	75*	0.7	0.33	21.2	65.2	3.5	6.9	62.0	14.0	10.6	9.0
	Whole	1.4	.....	21.0	65.5	2.3	7.1	56.0	18.0	7.0	14.9
	0-7	4.1	0.69	20.7	65.6	2.3	6.7	61.5	13.0	7.0	13.8
	7-22	1.5	.....	21.0	66.0	2.2	6.3	63.0	12.5	6.7	13.0
"C"	22-45	0.8	.....	21.6	65.5	2.3	6.6	55.5	20.0	7.0	13.5
	45-75	0.6	.....	21.6	65.1	2.4	7.1	49.0	25.0	7.3	14.9
	75*	0.5	0.22	21.9	64.5	2.5	7.0	46.0	28.0	7.6	14.3
	Whole	1.2	.....	19.6	66.4	2.5	6.9	72.0 †(70.0)	2.0 †(3.0)	7.6	14.1
	0-7	2.2	1.04	19.3	65.9	2.5	6.8	72.0	1.0	7.6	13.8
	7-22	0.9	0.41	20.0	66.0	2.4	6.7	68.0	6.0	7.3	13.8
"D"	22-45	0.7	0.37	20.1	66.9	2.4	6.8	70.0	5.0	7.3	13.8
	45-75	0.6	0.38	19.4	66.8	2.5	7.3	72.0 †(68.5)	1.0 †(4.5)	7.6	15.1
	75*	0.3	0.42	19.5	66.5	2.6	7.4	70.0	3.0	7.9	15.1
	Whole	0.7	.....	23.8	65.4	5.6	3.5	54.5	27.0	17.0	0.6
	0-7	2.6	0.11	21.0	65.7	7.1	4.2	64.0	12.5	19.8	‡1.0
	7-22	0.8	.....	23.0	66.3	5.4	3.5	64.0	17.5	16.4	0.0
"E"	22-45	0.5	.....	24.7	65.6	5.0	3.4	50.5	33.0	15.2	0.5
	45-75	0.4	.....	24.8	65.2	5.4	3.3	46.0	36.5	16.4	0.0
	75*	0.3	0.12	25.0	65.4	5.8	3.7	38.0	43.0	17.6	0.0
	Whole	.....	.....	21.9	65.9	2.6	5.8	59.5	18.0	8.0	10.8
	0-10	.....	.....	21.1	66.5	2.5	6.0	66.5	10.6	7.6	11.6
Rordam	10-25	.....	.....	22.3	65.9	2.5	5.5	59.0	19.0	7.6	10.3
	25-50	.....	.....	22.4	65.0	2.6	5.6	56.5	21.5	8.0	10.4
	> 50	.....	.....	22.8	64.2	2.7	6.1	49.0	36.0	8.3	12.8

* = 200-mesh sieve.
† Figures in parentheses have had allowance made for CaO combined with SO_3.
‡ = $2CaO \cdot Fe_2O_3$. 3CS = $3CaO \cdot SiO_2$. 2CS = $2CaO \cdot SiO_2$. 4CAF = $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$. 3CA = $3CaO \cdot Al_2O_3$.

ground cement containing the usually added gypsum, the results show that there is a tendency for the calcium sulphate in the clinker (resulting largely from the absorption of sulphur gases from the kiln atmosphere) to be present to a greater extent in the fine fractions.

Tricalcium Silicate Probably Grinds Easier

It is believed that the concentration of the tricalcium silicate in the finer fractions is due to a greater ease of grinding this constituent. The lumps of clinker are a heterogeneous sintered and sometimes fused mass of the several constituents. The fact that the last of these constituents to form is the tricalcium silicate, due to its high temperature of formation from the oxides, would seem to indicate that it generally would be the most friable. Hence, in the course of crushing and grinding it would more readily reduce to a given size than the other components. Since in the usual mill procedure the coarse limit of the grinding fixes the amount of the grinding, it would very likely follow that in attaining this limit, the softer particles had been subjected to more attrition than the harder ones.

This work does not indicate that in the air elutriation there has been a segregation of the components of the cement other than that of size. That the finer sized fractions differ in chemical composition from the coarse ones is due to the fact that in the grinding of the clinker there has been a greater size reduction of some of the components than of others. Therefore, in the commercial cements, it is likely that different sizes will vary in composition. Shimizu, to whom reference has already been made, separated the fractions he obtained by means of sieves of various dimensions and thus secured three fractions, in which from the fine to the coarse, the hydraulic modulus ranged from 2.25 to 2.17 and the silica modulus from 2.75 to 2.63.

Conclusions

A separation of the particles of ground clinker from five different sources into five sizes shows that in commercial cements:

(1) The finer particles contain a greater percentage of ignition loss than coarser ones.

(2) The tricalcium silicates will very likely be more concentrated in the finer particles than in the coarse ones.

(3) The dicalcium silicates very likely will be more concentrated in the coarser particles than in the fine ones.

(4) There seems to be but little difference between the fine and coarse particles as to the relative distribution of $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$ and tricalcium aluminate.

(5) These facts illustrate the difficulties that are encountered in interpreting and evaluating data showing the relation of particle size to strengths and other physical properties of the cement, especially when no data are presented showing the compositions of the sizes. When the compositions of the sizes being compared are different, it is hazardous to assume that differences in physical properties are the result of differences in particle size.

(6) That apparently the activity of the finer sizes is due not only to their greater surface producing a more rapid and greater reaction with the water than the smaller total surface of an equal weight of coarser particles, but also to the finer sizes being composed largely of the more rapidly reacting tricalcium silicate.

Separation of Feldspar from Quartz

A LABORATORY SEPARATION of feldspar from quartz, which promises to become a commercial process, is described by H. G. Iverson in a recent issue of the *Engineering and Mining Journal*.

The material tested was pink granite containing 5-10% biotite mica, 65-75% orthoclase feldspar and 20-25% quartz. The biotite mica offered the most difficulty. Efforts to concentrate it out on tables at coarse mesh sizes were unsuccessful, but crushing to 65-mesh broke the mica into scales while the other minerals were in rounded grains. The separation was not due to gravity but appeared to be due to a skin flotation effect. The concentrate was retabled twice and all the tailings were pure biotite, while the final concentrates contained only traces of this mineral.

Excellent recoveries of feldspar were made by treating the quartz-feldspar concentrate, left after tabling out the biotite, by flotation. The reagents used were 0.5 lb. each of terpineol and sodium oleate with lead nitrate in amounts varying from 0.1 to 0.3 lb. per ton. The best results were with 0.25 to 0.3 lb. per ton. This produced concentrates running 95.5 to 100% feldspar.

Attempts to remove the biotite mica as well as the quartz by flotation were unsuccessful because part of the biotite always floated along with the feldspar.

One of the methods of analysis used on the samples of this test employed the microscope. The samples were made into briquets with bakelite resin. These were vigorously polished and then etched with hydrofluoric acid. The quartz particles remained clear and the feldspar was changed in color to gray or black. By counting the areas exposed by each mineral analytical results were obtained which checked fairly well with those obtained by the less rapid chemical analysis.

Hints and Helps for Superintendents

Plant Uses Own Materials for Construction

INTERESTING uses of sand and gravel in construction have been made at the plant of the Construction Materials Corp., Humboldt, Ia., formerly the Humboldt Tile and Gravel Co. These uses are shown in accompanying illustrations.

All of these uses employ concrete pipe, which of course requires aggregate in its manufacture. Cracked and chipped tile were largely used, thereby salvaging an accumulated supply of second quality material.

Supporting columns of concrete pipe

One of these uses is for supports of the waste sand pipe; another is for building retaining walls for sand and gravel storage. In each of these uses the pipe were filled with sand as they were placed, making substantial construction. In a third application columns for a sand pump and motor house were built in the same manner except that concrete fill was used in place of sand.

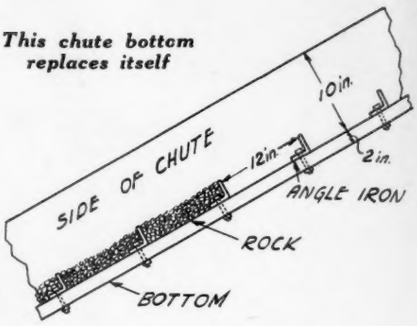
Concrete columns carry water line

Increasing Life of Rock Chute

By Dare Paris
Monrovia, Calif.

IN MANY crushed rock and gravel plants chutes are built from the end of belt conveyor to screens or from screens to bunkers with little regard to the wear on the chute itself. Here is a method for prolonging the life of such chutes. The chute is built of planks with 3-in. angle iron spaced 12 in. apart and perpendicular to the flow of the material in the bottom of the chute. The stone fills to the top of the angle iron, forming the wearing surface. This type of chute will last for years without attention.

This chute bottom replaces itself



Another advantage is the fact that the stone flows down this type of chute with a great deal less force. This, of course, eliminates a great deal of breakage and fines which occurs when the stone falls into the bunkers with greater force.

Old Screen Sections as Safety Measures

STILL ANOTHER USE for old revolving screen sections is shown in the accompanying illustration. Here such a screen section is used at the entrance to a tunnel that is being driven in a quarry where the tunnel system of blasting is used.

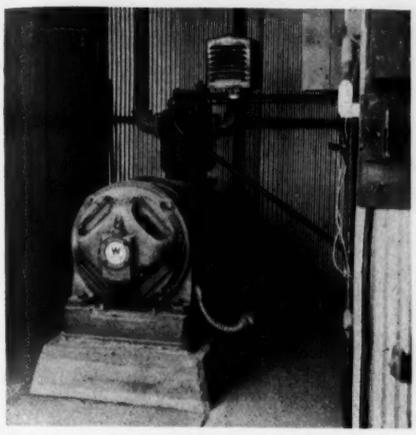
The screen serves as a safety measure in protecting against any loose stone which might fall from the face above.

Concrete pipe filled with gravel make good retaining wall

Adequate protection that costs little

Air Filter on Small Compressor

AIR FILTERS on compressors have usually been confined to the larger sizes of compressors but the trend appears to be toward application of filter units on all compressors. This is especially desirable in districts like the American desert, where wind and sand storms are frequent.



No inconvenience with this

The illustration shows an Emmit F. Annis air filter on an Ingersol-Rand Type 20 air compressor with the unit directly connected to a Westinghouse induction motor. This small unit supplies air for the repair shop and miscellaneous use at the sand and gravel plant of the Six Companies, Inc., Junction City, Nev.

Keeping the Oil Level in Crankcases

By Orville Adams

Consulting Diesel Engineer, Dallas, Texas

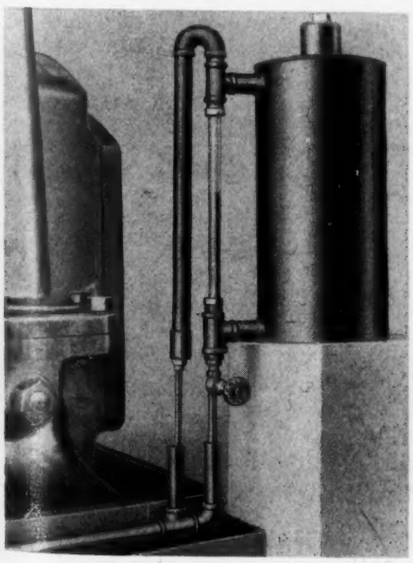
IN MANY Diesel and gas engines, as well as compressors and similar machinery having crankcase sumps for lubricating oil, this oil level must be maintained at a certain point at all times in order to assure proper lubrication. This requirement calls for constant attention on the part of the operator. Unless deligence is shown, neglect may occur and the result will be serious, particularly with certain types of stationary engines.

Several methods have been devised to supply "make-up" oil to the crankcase as needed. In cases where the oil is regularly withdrawn by means of a pump and filtered, the "make-up" oil is supplied at the same time in some manner. However, in other cases, where the "make-up" oil is added by the operator, there is always the chance that he will forget to supply the oil and permit the level to drop below safety. In such cases reminders, such as low oil alarms, have been installed, but when these fail to work, there isn't any factor of safety to depend upon.

One operator having several engines, including Diesel and large gas engines, together with horizontal air compressors, in his plant found the duty of supplying oil to numerous crankcases a quart or so at a time to be irksome and quite a burden on his time. After careful study, and some experiment, a system was worked out to include the use of the device illustrated. The parts were obtained locally with very little expense. The tank was made of a 2-ft. length of 12-in. iron pipe, with the ends made of like thickness of steel plate and welded on to make a closed cylindrical vessel with a fill plug at the top.

Several gallons of lubricating oil are supplied to the tank and the fill plug is screwed on to make the tank air tight. When the valve is "cracked" to permit oil to flow to the crankcase fill pipe the oil will continue to flow until the other riser on the fill pipe has an oil level sufficient to cover the air vent pipe placed in it and communicating with the top of the supply. A vacuum is then brought about above the oil sufficient to stop its flow until the oil level again falls enough to uncover the vent pipe, at which time oil will again flow to the crankcase until the proper level is restored and the oil is again stopped from flowing.

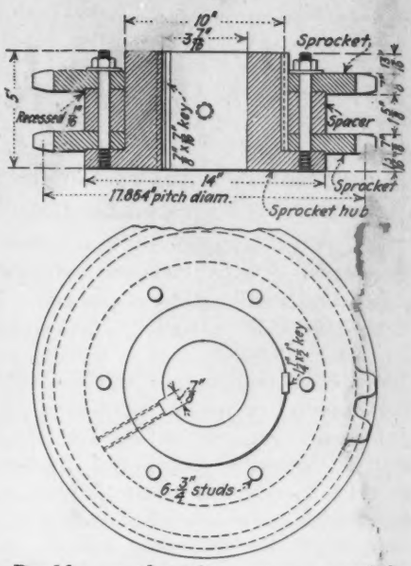
This device does not depend on moving parts or mechanical motion. It is practical, reliable and applicable to many kinds of cases where oil levels are required in crankcases. It may also have other applications.



Vacuum controls oil level

Novel Conveyor Drive

RAISING the conveyor speed to increase the capacity of the crushing plant caused trouble with the conveyor-chain drives, writes F. J. Martin of Miami Copper Co., Miami, Ariz. The higher belt speed increased the load on the drive mechanism, and affected the life of the chains proportionally. This made necessary the installation of more powerful drives, or remodeling of the ones in use. The latter method was selected on account of the lower cost. It was accomplished by replacing the single chain with a double chain drive and the novel twin sprockets shown in the accompanying illustration. Each unit consists of a hub, with two bolted-on sprocket disks, and a spacer, all made of cast steel. The 1¼x½-in. key and the ⅛-in. recess on each sprocket afford additional stability and insure perfect alignment of the two sprockets.—*Engineering and Mining Journal.*



Double sprocket gives more powerful drive

A Safety-First Rogue's Gallery

HERE is one way the Marquette Cement Manufacturing Co. keeps its accident record low at the Cape Girardeau, Mo., plant. The accompanying illustration shows the "Rogue's Gallery" in the plant office. Any employe committing some breach of rules or other act which might cause an accident has his picture criss-crossed with prison bars and placed in the "Rogue's Gallery." The "Rogue's Gallery" has aided the Cape Girardeau plant in its excellent record.

A place to keep out of

Rock Products Clinic

Long Rotary Kilns vs. Chain-Grate Short Kiln Combination

THE EDITOR: Recently articles have appeared in ROCK PRODUCTS and other trade journals advocating the adoption of a "chain-grate, short, rotary kiln" combination, now being successfully used in some of the latest portland cement plants built in Europe. The main reason for the adoption of the chain-grate equipment, as urged in these articles, is greater economy in fuel. In these articles it is stated that a barrel of portland cement clinker can be burned with chain-grate, short kiln combination with a consumption of 581,500 B.t.u. per bbl. of clinker burned, or a consumption of 45.2 lb. of coal having 12,850 B.t.u. per lb.

I am proposing the use of extremely long rotary kilns, with economy in fuel as one of *three prime benefits* to be accomplished. It is my contention that one barrel of portland cement clinker can be burned in a rotary kiln, lengthened to 800 ft., with a consumption of approximately 550,000 B.t.u. of heat consumed, or equivalent to 42.3 lb. of coal containing 13,000 B.t.u. per lb.

We will assume, however, that each of the two methods above mentioned will produce the same result in economy of fuel consumed, and that all the heat consumed in the burning of clinker, other than the amount required to retain the water in a gaseous state, will be utilized in the burning of clinker. No additional economy in fuel in the kiln proper can be possible. Although a rotary cement kiln 800 ft. long would show a stack temperature of approximately 425 deg. F., by the use of chains, Z-bars or angle bars, at the extreme back end of kiln, the temperature, in fact, can be brought down to an exact and regulated temperature, just above the point where condensing of steam into water would take place, thereby preventing the precipitating of moisture into the raw material before the gases escape from the back end of the kiln. Under such conditions no heat is wasted, other than that required to prevent precipitation of moisture.

We will assume, also, that by the use of the short-kiln, chain-grate combination the same control of the gas temperature before escaping to the stack will be possible as is accomplished in the operation of the long kilns. We will also assume that the gases escaping from the back end of the kiln, since being at the same temperature for the chain-grate, short-kiln combination as that of the long kiln, will, therefore, be in the same condition for recovering CO_2, and permitting the CO_2 to be manufactured into "gas-ice," or "dry ice." This is the second principal advantage of the long kiln advocated by me. If, however, outside or cold air is allowed to enter through the chain grates or at point where chain grates are connected with the kiln and thereby dilute the gases so that the percentage of CO_2 is below 26.5%, the content contained in gas when the long kiln is operated, then a disadvantage must be registered against the short-kiln, chain-grate combination as against the long kiln. In such event it would, in fact, disbar the use of the chain grate, if "gas-ice" is to be successfully manufactured as a byproduct.

The third advantage of the long kiln is more perfect burning of the clinker so that a quick-hardening cement will be obtained. It would seem possible to accomplish this result, depending solely on the *length* of chain grates and the *slowness* of speed at which the chain grates would be allowed to travel; also length of the kiln section following the chain grate.

The whole problem will therefore resolve itself into a comparatively economical operation of an 800-ft. cement kiln, as one piece of machinery having no complications, as against the economical operation of a shorter kiln plus chain grates. Of course, it will be not only a question of cost of power of operating a kiln as one piece of machinery, as against the more complicated combination of kiln and chain grate, but also a problem of maintenance as well. The question of first cost of equipment will also enter into the problem; also the question of shut-downs and loss of time required for repairs. Also the richness of the CO_2 in the gases as they pass from the back end of the kiln and/or chain grate flue.

While I have had no experience whatsoever in the operation of a chain grate system, I will confess, I would prefer the long kiln and the retention of the old method of having but one piece of machinery, to-wit: a single long kiln, to the substitution of a more complicated system in the use of combination of shorter kiln and chain grate, provided that the comparative costs of operating the two methods are fairly equal, and that the loss of time and economy in operation by each of the two methods is comparatively the same.

The further fact that the chain grate is a patented article and that royalties or cash bonus would probably have to be paid to the patentee for the privilege of using it, while the long kiln is not patented, and free to be used without royalty payments to any one whomsoever, would be another point in favor of the single long kiln as against the combined short-kiln, chain-grate combination.

AMAN MOORE,
Cement Engineering Co., Los Angeles, Calif.

Getting Rid of Organic Matter in Sand

THE EDITOR: I have a large deposit of sand which shows on test a trace of organic matter. This can be removed by a wash of a 3% solution of sodium hydroxide.

My object in writing is to ask if any of your subscribers have had a similar experience, and what method they used in getting rid of this organic matter.

"ORGANIC."

Editor Shaw's Reply

"Organic matter" is a very general name for certain substances which lessen or destroy the value of sand as concrete fine aggregate. It includes, for example, humus with tannic and perhaps other organic acids that have a bad effect on the setting and hardening of cement; lignite and soft coal which lessen the strength slightly but which are more injurious because they "pop out" of finished surfaces; and some organic compounds of iron which interfere in some unexplained way with the proper setting and hardening of the cement in concrete.

Humus and tannic acid may be removed by thorough washing. A simple arrangement at a plant in Virginia settled the sand in an ordinary tilting box. The sand, as a thick pulp, was run into a broad flat trough above which were a number of sprays which washed the sand thoroughly. The sand and water were then run to a second tilting tank where the overflow carried away practically all the deleterious substances.

Lignite and soft coal must be removed by classification, either in a hindered settling device or by one of the screw devices on the principle of the log washer in which the deleterious material is worked to the top and then washed off by a surface current.

Little is known of the organic compound or compounds of iron which affect the strength of concrete when they occur in sand. The writer has heard of two deposits with this form of contamination. Both were on the north bank of the Ohio river. Laboratory tests showed that the sand could not be cleaned except by chemicals and that the cost was too high for a commercial method.

Presumably the contamination of "Organic's" deposit is of the first type. If so, it can be removed by washing as described. An even better method would be to use two sand drags or screws in series, taking the sand out as dry as possible from the first and rinsing thoroughly with water before sending it to the second. In some cases it might even be necessary to use three such machines. A laboratory test would show how far the washing should be carried.

EDMUND SHAW.

On Becoming a Blasting Expert

THE EDITOR: Mr. "Midwest Super," in the "Clinic" department of ROCK PRODUCTS, July 16, 1932, expressed well the problems of blasting, due to the various geological formations. With 20 years of underground and quarry work I, too, have been perplexed on different jobs. Powder companies have field men to assist the user of dynamite to get the best results and their laboratory staffs have prepared a theoretical standard for the amount of powder to use for each foot or ton of rock to be broken. In my opinion there is no set rule that will apply in all cases where rock is to be drilled and blasted. You may drill a round of holes a certain way in one mine or quarry, using a certain class of powder, and obtain 100% results, while this identical round of holes using the same powder would fail in another mine or quarry.

It has become obvious to me, that a certain amount of experimenting must be done in the way holes are drilled, as well as the quantity and the strength of the powder used. I have found the field men of the large powder companies of invaluable service, because of their wide knowledge of their product and their equally wide knowledge of different rock formations. Just lately this was demonstrated, as I shall explain.

We recently were operating a quarry of red rhyolite which in its natural formation was inclined to be stratified. We used jackhammers for our drilling, generally drilling holes to a depth of 14 ft. We endeavored to keep our quarry face as nearly perpendicular as possible, but due to freaky slips and faults the face was always, more or less, inclined so that the average hole had about 3 to 4 ft. of ground on the collar, whereas it had approximately 6 ft. on the bottom. We used to spring these holes with about eight sticks of 7/8-in. 40% gelatin powder, then load them with about 25 lb. 20% free-running bulk powder.

This gave a good break with little block holing or secondary shooting. The fines had to be excluded in the general run of rock due to surface dirt. This rock is used for roofing granules, therefore extreme measures were used to keep it as free from dirt as possible.

This quarry was abandoned about a year and a half ago and a new quarry started about a mile away in the same general formation. This new quarry was the same rock, red rhyolite, but of an altogether different texture. This new quarry rock was a homogeneous mass of granulated particles and as tough as rock usually gets, in so far as breaking it was concerned.

We started off using the same methods as at the old quarry, but it did not take long to show that something was wrong. Drilling and blasting as in the old quarry, a good 75% of all rock broken had to be redrilled and blasted again to bring it to hand hammer size.

We then started drilling our holes still 14 ft. deep but with 2 or 3 ft. on the collars and from 3½ to 4 ft. on the bottoms. These holes we did not "spring" but simply bore-hole-loaded them to within 3 or 4 ft. of the collar. Results were that we had a considerably finer break, but still too much block holing. We then turned to 40% free-running powder and now get a uniform man size break with a very small amount of boulders to redrill and shoot.

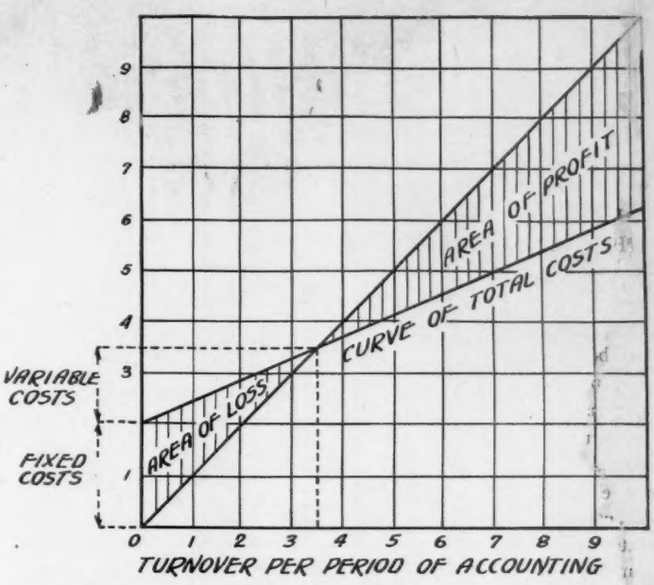
This is just one of many experiences where it just required a little thinking, along with a little experimenting, to get the results wanted, and I would say to Mr. "Midwest Super" that there is no expert or authority on rock blasting unless it be the major powder companies' field men, and they must be on the job, see a round drilled, study the formation, make their recommendations as to the kind of powder to be used, and even then they sometimes make mistakes themselves. Referring to hand books published by the explosives manufacturers will help anyone in the blasting field, but theory versus practice is no where so well demonstrated as in the rock blasting field; that is, theory doesn't work at all, but practical experience will ultimately show you the right method.

CHARLES JENKINS,
Pacific Minerals Co., Inc.,
Barstow, Calif.

Control of Operation by Examining Costs

THE EDITOR: The problem of how fixed costs, proportional costs, sales proceeds and utilization of capacity are related to each other and what importance these individual items possess in reference to the profitableness of the operation, have come under discussion repeatedly in ROCK PRODUCTS. Therefore a similar process may be of interest, which is based chiefly upon the division into fixed costs and variable costs. This process should find application in the sales organization, since by it profit as well as loss can be looked over more easily.

The graphic method shown here results from a graph based upon plotting a turnover curve on a rectangular system of coördinates. For any one period of accounting and, indeed if possible, for several months, the cost figures are taken from the bookkeeping system. A uniform scale is taken as a basis for them, say 100,000 or 10,000 units. As to the costs, one distinguishes between fixed and proportional costs as appears in the following example. From this the "cost shears" can be drawn.


AREA OF PROFIT
CURVE OF TOTAL COSTS
VARIABLE COSTS
FIXED COSTS
AREA OF LOSS
0 1 2 3 4 5 6 7 8 9
TURNOVER PER PERIOD OF ACCOUNTING

Graph showing relation between turnover, fixed costs and proportional costs

FIXED COSTS	
Salaries	1.00
Taxes, etc.	0.50
Publicity work	0.30
Auxiliary wages and material	0.07
Contributions, interest	0.11
Social service	0.01
Pensions, etc.	0.01
Total	2.00

PROPORTIONAL COSTS	
Material, purchase	0.80
Wages, production	0.67
Commissions and rebate	0.01
Discounts	0.01
Freight, etc	0.01
Total	1.50

If one draws a horizontal line at 3.5 of the ordinate, the intersection *P* of this line with the diagonal is the point at which profit and loss hold the balance. If one draws now another line from point 2 (fixed costs) to *P*, one obtains hereby the curve of the total costs, and with it the possibility of being able to read readily the profits or losses at the various turnovers. For example, at a turnover of 5 units one can recognize that a profit of 1 results, whereas at a turnover of only 2 units obviously 1.5 value units are lost. One learns, therefore, how much is gained, or lost, when the turnover decreases or increases. But, especially, one can look over what influence the individual kinds of costs exert upon the fixed as also variable costs, since the effect of the fluctuating degree of business appears directly from the graphic representation.

DR. CURT R. PLATZMANN.
Berlin, Germany.

Editorial Comment

Use More Trade Acceptances

In ROCK PRODUCTS, July 16, 1932, p. 15, was an announcement that one of the large powder companies would take trade acceptances from its customers in payment for its product; at the same time was published a facsimile of a standard trade acceptance and a description of its use. Since then interest in the use of trade acceptances in this industry has been growing; the latest piece of news in ROCK PRODUCTS, October 8, p. 56, being to the effect that the Associated General Contractors of America would endeavor to promote the use of trade acceptances in payment for construction materials, since this would help a great deal to eliminate the irresponsible contractor, who does not pay his bills when due, and frequently does not pay at all. If the use of trade acceptances will accomplish what the contractors hope and believe, the rock products producer or seller should work just as industriously to establish their use as the contractor.

Every business man agrees that what we need most today is an expansion of credit. Credit has been so restricted for the past year that banks have been unwilling to loan on the best security or collateral, because of fear that it could not be liquidated when and if necessary. These objections do not apply to trade acceptances, for trade acceptances properly drawn and representing a transfer of commodities between two responsible parties are practically as liquid as currency. In fact the Federal Reserve Banks may use them as a basis for currency. Moreover, a widespread use of trade acceptances will prevent amateurish attempts to inflate the national credit structure by Congress—such attempts will not then be necessary.

A trade acceptance is thus defined: "The trade acceptance is simply a time draft by the seller upon the purchase of goods and customarily sent by the seller to the buyer accompanying the invoice for the goods. The buyer signs the trade acceptance across the face with date and place of payment. He then returns it at once to the seller, who then is in possession of a desirable form of two-name commercial paper, with a definite maturity date, eligible for rediscount at the Federal Reserve Banks if maturing within 90 days. The buyer may take the initiative in filling in the acceptance form and signing it across the face of the instrument as acceptor and then forwarding it to the seller." Thus the trade acceptance may originate with either buyer or seller.

Some reasons why the universal use of trade acceptances in dealings between contractors and material men may accomplish what the responsible contractors desire are: (1) Unwarranted inducements in the form of extra time or extra discounts will prevent or hinder the free negotiation of such acceptances; (2) the time limit for payment must not exceed 90 days to be rediscountable; (3) trade acceptances are a great improvement over the open account system as now universally practiced, will save money in bookkeeping, save interest on borrowed capital to finance buyers—a business "vice" practiced nowhere else in the world but in the United States; will prevent losses under present conditions all too common; (4) will make for better morals in business and for better credit and banking conditions throughout the United States.

Everybody who does business in these days knows the difficulty in making collections—one tight place in the circle of business transactions slows up the circulation among all the participants. This is because credit represented by "open book accounts" remains tied up until liquidated at or after maturity, and the date of maturity is indefinite and uncertain. The only method of making such receivables liquid is to "hock" them to a bank, and banks are not keen about such security, certainly not at the present time; and when the producer or seller is forced to raise money in this way his credit is definitely injured—perhaps beyond repair. The discounting of a trade acceptance involves no such disrepute—it is in fact the business-like thing to do, and it immediately releases the necessary working capital for the producer.

In normal times when commodities are moving freely and credit is abundant the defects in our present methods of open account transactions are not so apparent, but "a generous credit granting in this country has dulled commercial men regarding the importance of meeting obligations promptly." Therefore, we have involved our business transactions in a costly overhead which is entirely unnecessary. Unquestionably, if the materials producer or seller is able to keep afloat under such conditions it is the responsible contractor who pays his bills when due, who finances this superstructure, and thus incidentally is actually financing his irresponsible contractor competitor.

The big national advantage of trade acceptances is that probably two or three times the volume of business can be done on the same capital through their use instead of open book accounts, and that it can be done safely and conservatively. Hence a universal use of trade acceptances will lower the costs of doing business and all will benefit.

The trade acceptance does not replace the cash discount system. The logical way for the rock products producer to sell his product is on the following terms: "(1) If cash is received by the seller within ..... days, a discount or premium of .....% will be allowed; (2) if credit is given and accepted settlement is to be by trade acceptance, maturing in ..... days; no open book accounts." The irresponsible, shifty customer may not want a trade acceptance because as the acceptor of a trade acceptance in the hands of a third party (as a bank) "for value," he can make no legal defense should he try to avoid his just debt.

When a trade acceptance falls due the bank which has discounted it sends it to the office or bank of the acceptor where it has been made payable. If not paid, or protested, the bank which discounted it returns the trade acceptance

to the seller, or drawer, who is in fact the endorser, and of course charges it against his account. If the endorser, or seller, accepts part payment, or a note, or otherwise gives an extension of time, the bank will not again discount the trade acceptance, for now its purpose and liquidity have been destroyed.

So, although a trade acceptance does not prohibit or prevent a producer or seller from continuing to "carry the bag" for his delinquent customer, he cannot avoid personally carrying the cost of thus financing the customer, and would be no match for a competitor who made legitimate use of the trade acceptance. The latter's savings in costs of doing business would permit him to sell at prices so much lower than the producer operating on open book account, with long-time frozen credits and losses due to unjustified leniency, that the open book producer would soon be left with no customers that anyone else wanted—the kind of customers that lead one into bankruptcy.

Those who are sufficiently interested—and we hope for the future of American business that includes every reader—can obtain complete information about the use of trade acceptances by writing to the American Acceptance Council, 120 Broadway, New York City. We believe if they will read the little booklet prepared by this organization on the advantages of the trade acceptance, they will be converted, as the Associated General Contractors have been; and it may be the means for rapidly increasing the speed of recovery from the recent depression.

Sherman Law Not to Be Avoided

A special three-judge United States Circuit Court in Washington, D. C., October 10, decided that the Appalachian Coals, Inc., was a combination in restraint of trade, within the meaning of the Sherman anti-trust law. The Appalachian Coals, Inc., is made up of 137 producers of bituminous coal in Virginia, West Virginia, Kentucky and Tennessee, and it proposed to act as an exclusive selling agency with power to fix prices and prorate production for this group of producers. The Appalachian Coals, Inc., is the product of the very best legal minds available, for the purpose of doing things that many producers believe must be done to rehabilitate not merely the coal industry, but other industries as well.

The promoters contended that the Appalachian Coals, Inc., was no different in effect than the United States Steel Corp., and other big business; the court held that the steel corporation and similar corporations have grown large "through natural process" and that they could not be dissolved without injury to the public interest; that combinations of independent producers are "artificial developments designed to limit the operation of natural law."

The court was sympathetic to arguments that this organization was essential to the preservation of the coal industry; that there was no monopoly, in that only 54% of the production of the territory was included; that prices would be fair, etc. But, said the court: "We cannot repeal acts of Congress, nor can we overrule decisions of the Supreme Court interpreting them." Thus, if we want or need legal combinations to steady production and uphold prices, the only recourse left is a change, or a repeal, of the Sherman anti-trust law, although as a matter of routine the Appalachian Coals, Inc., will appeal to the Supreme Court.

There is doubtless a very fair chance, if the present administration remains in power, and may be any way, of amending the anti-trust laws to give business and industry more power to save itself from reckless price-cutting. But there is reason to doubt if a change in the law could be made which would actually cure the trouble, any more than prohibition laws have cured excessive drinking or promoted temperance. After you have furnished producers with facts and statistics on which to conduct their business intelligently and profitably, after they have been shown time and time again that price-cutting merely destroys profits without in the end adding any more volume to the individual producer's business, after the necessity for self control and tolerance has been drummed into them over and over again—and they still cut each other's throats—is it reasonable to believe that they can be compelled to change their ways by force any easier than by education?

Supposing the law is changed to permit combinations to control production and fix prices, will the customers sit back and applaud such developments? A short time ago the railways were appointing a "czar," who among other economies to be effected was "to save millions in the purchase of supplies now bought at comparatively high prices because the railways wish to retain the traffic of the producers or sellers"—we are quoting from the *Wall Street Journal*. Particularly did the railways object to the price of steel, notwithstanding the fact that like most others the steel industry is operating at a loss. But the steel industry, even under depression conditions, has done a better, or more intelligent, job of price maintenance than other basic material industries, although the railway purchasers apparently resent it.

The railway managements resent the "high price" of steel because they themselves have little or no control of the price of transportation. Government supervision relieves them of that, just as government supervision would sooner or later relieve producers of such responsibility if the government does see fit to permit legal combinations. For the government would have to step in to save them from the very customers they hope to set the price for.

It should be obvious to advocates of legal combinations to fix prices and control production that the same power to combine also lies with the purchaser, and if the "czar" of the railway industry actually does exercise his power to make purchases for the entire group of railways "on a competitive bid basis" as was proposed, he would be czar of many industries besides the railways, for he could make or break them at pleasure. Combinations, legal or otherwise, will not succeed without primary emphasis on promoting intelligence, and intelligence ought to be able to succeed without combinations. We would like to see the anti-trust laws revised because they probably do prevent the spread of more specific business intelligence, but we are not optimistic that the mere right to organize combinations to fix prices is ever going to settle economic problems.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	*Dividend
Allentown P. C. 1st 6's[27]	10-18-32	No market		
Alpha P. C. com.[2]	10-17-32	7¾	8½	25c qu. Apr. 25
Alpha P. C. pfd.[2]	10-17-32	60	.....	1.75 qu. Sept. 15
Amalgamated Phos. 6's, '36[19]	10-14-32	89	.....	
American Aggregates com.[19]	10-14-32	1	3	
American Aggregates pfd.[19]	10-14-32	5	15	1.75 qu. Jan. 1
American Aggregates 6's	10-17-32	40 actual sale		
Amer. L. & S. 1st 7's[27]	10-18-32	50	.....	
Arundel Corp. com.	10-17-32	20 actual sale		75c qu. Oct. 1
Bessemer L. & C. Class A[4]	10-14-32	.....	2	
Bessemer L. & C. 1st 6½'s[4]	10-14-32	23 actual sale		
Bloomington Limestone 6's[27]	10-18-32	No market		
Boston S. & G. new com.[27]	10-14-32	2	5	5c qu. July 1
Boston S. & G. new 7% pfd.[27]	10-14-32	18	25	87½c qu. Oct. 1
Boston S. & G. 7's, 1934[19]	10-14-32	50	60	
California Art Tile, A	10-13-32	1½	4¼	
California Art Tile, B[9]	10-13-32	.....	4	
Calaveras Cement com.	10-13-32	.....	2¼	
Calaveras Cement 7% pfd.	10-13-32	.....	50	1.75 qu. Oct. 15
Canada Cement com.	10-17-32	4	4⅜	
Canada Cement pfd.	10-17-32	28	.....	1.62½ qu. June 30
Canada Cement 5½'s[34]	10-14-32	80¼	81	
Canada Crushed Stone bonds[34]	10-14-32	60	.....	
Canada Crushed Stone com.[42]	10-15-32	1	.....	
Certainteed Products com.	10-17-32	1⅝	2½	
Certainteed Products pfd.	10-17-32	7	10	1.75 qu. Jan. 1
Certainteed Products 5½'s	10-17-31	41 actual sale		
Cleveland Quarries	10-17-32	.....	30	10c qu. Sept. 1
Consol. Cement 1st 6½'s, A[44]	10-18-32	No market		
Consol. Cement pfd.[27]	10-18-32	No market		
Consolidated Oka Sand and Gravel (Canada) 6½'s[12]	10-14-32	50	60	
Consolidated Oka Sand and Gravel (Canada) pfd.[42]	10-15-32	.....	50	
Consol. Rock Prod. com.[35]	10-13-32	5c	15c	
Consol. Rock Prod. pfd.[35]	10-13-32	1½	2½	
Consol. Rock Products units[35]	10-13-32	1	2	
Consol. S. & G. pfd. (Can.)	10-17-32	.....	50	50c qu. Aug. 15
Construction Mat. com.	10-17-32	¾	1	
Construction Mat. pfd.	10-17-32	1	4½	
Consumers Rock and Gravel, 1st Mtg. 6's, 1948[35]	10-13-32	36	40	
Coosa P. C. 1st 6's[27]	10-18-32	15	.....	
Coplay Cem. Mfg. pfd.[47]	10-18-32	7	10	
Coplay Cem. Mfg. 6's, 1941[47]	10-18-32	55	60	
Dewey P. C. com.[47]	10-18-32	65	75	
Dolese and Shepard	10-15-32	9½	11	$1 qu. Jan. 1
Dufferin Pav. & Cr. Stone pfd.	10-17-32	.....	25	1.75 qu. Apr. 1
Dufferin Pav. & Cr. Stone com.	10-17-32	.....	5	
Edison P. C. com.[47]	10-18-32	3	5	
Edison P. C. pfd.[27]	10-18-32	1	.....	
Federal P. C. 6½'s[47]	10-18-32	50	60	
Giant P. C. com.[2]	10-17-32	½	2	
Giant P. C. pfd.[2]	10-17-32	3	6	
Gyp. Lime & Alabastine, Ltd.	10-17-32	2½	3	
Gyp. Lime & Alabastine 5½'s[34]	10-14-32	.....	56½	
Hermitage Cement com.[11]	10-15-32	3	5	
Hermitage Cement pfd.[11]	10-15-32	15	20	
Ideal Cement 5's, 1943[29]	10-15-32	85	89	
Ideal Cement com.[29]	10-15-32	14	16	25c qu. Oct. 1
Indiana Limestone 6's	10-15-32	14 actual sale		
International Cem. com.	10-17-32	9¾	10⅛	50c qu. Mar. 31
International Cem. bonds, 5's	10-17-32	63 actual sale		Semi-ann. int.
Kelley Island L. & T.	10-17-32	10½	11½	25c qu. Oct. 1
Ky. Cons. Stone com.[45]	10-13-32	1	2	
Ky. Cons. Stone 7% pfd.[45]	10-13-32	10	15	
Ky. Cons. Stone 1st Mtg. 6½'s[45]	10-13-32	15	18	
Ky. Cons. St. V. T. C.[48]	10-13-32	1	2	
Ky. Rock Asphalt com.	10-17-32	¾	1⅛	
Ky. Rock Asphalt pfd.	10-15-32	20	30	
Ky. Rock Asphalt 6½'s	10-17-32	57	62½	
Lawrence P. C.[2]	10-17-32	6	11	
Lawrence P. C. 5½'s, 1942[2]	10-17-32	33	38	
Lehigh P. C. com.	10-17-32	6	8	
Lehigh P. C. pfd.	10-17-32	55	60	1.75 qu. Oct. 1
Louisville Cement[7]	10-13-32	60	80	
Lyman-Richey 1st 6's, 1935[12]	10-14-32	85	95	
Marbelite Corp. com.[35] (cement products)	10-13-32	5c	75c	
Marbelite Corp. pfd.[35]	10-13-32	50c	.....	
Marquette Cement com.[47]	10-18-32	5	7	
Marquette Cement pfd.[47]	10-18-32	50	55	1.50 qu. Oct. 1
Marquette Cem. Mfg. 1st 5's, 1936[46]	10-18-32	70	.....	
Marquette Cem. Mfg. 1st 6's, 1936[46]	10-18-32	75	.....	
Material Service Corp.	10-17-32	4	11	
McCrady-Rodgers 7% pfd.[22]	10-13-32	20	30	87½c qu. June 30
McCrady-Rodgers com.[22]	10-13-32	No market		75c qu. Jan. 26
Medusa P. C. pfd.[47]	10-18-32	45	50	1.50 qu. Apr. 1
Medusa P. C. com.[47]	10-18-32	6	8	
Monarch Cement com.[47]	10-18-32	55	60	
Michigan L. & C. com.[6]	10-15-32	45	.....	
Missouri P. C.	10-17-32	6½	8	25c qu. Jan. 30
Monolith Portland Midwest[9]	10-13-32	60c	90c	
Monolith P. C. com.[9]	10-13-32	1	1¼	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	10-13-32	1¼	1½	40c s.-a. Jan. 1
Monolith P. C. units[9]	10-13-32	3½	4¼	
Monolith P. C. 1st Mtg. 6's[9]	10-13-32	35	40	
National Cem. (Can.) 1st 7's[27]	10-18-32	75	85	
National Gypsum A com.[27]	10-18-32	2	3	
National Gypsum pfd.[27]	10-18-32	30	.....	1.75 qu. Oct. 1
National Gypsum 6's[5]	10-18-32	69	72	
National L. & S. 6½'s, 1941[19]	10-14-32	60	70	
Nazareth Cement com.[47]	10-18-32	3	5	
Nazareth Cement pfd.[47]	10-18-32	25	35	
Newaygo P. C. 1st 6½'s[27]	10-18-32	80	90	
New England Lime 6's, 1935[14]	10-14-32	No market		
N. Y. Trap Rock 1st 6's	10-17-32	65 actual sale		
N. Y. Trap Rock 7% pfd.[27]	10-18-32	.....	60	1.75 qu. Oct. 1
North Amer. Cem. 1st 6½'s	10-15-32	25 actual sale		
North Amer. Cem. com.[27]	10-18-32	No market		
North Amer. Cem. 7% pfd.[27]	10-18-32	¾	.....	
North Shore Mat. 1st 6's[15]	10-18-32	20	.....	
Northwestern States P. C.[47]	10-18-32	23	27	
Ohio River S. & G. com.	10-17-32	.....	5	
Ohio River S. & G. 1st pfd.	10-17-32	.....	50	
Ohio River S. & G. 6's[16]	10-17-32	20	40	
Oregon P. C. com.[9]	10-13-32	8	12	
Oregon P. C. pfd.[9]	10-13-32	80	85	
Pacific Coast Aggr. com.[40]	10-13-32	.....	½	
Pacific Coast Aggr. pfd.[40]	10-13-32	.....	1	
Pacific Coast Aggr. 6½'s, 1944[5]	9-30-32	12	14	
Pacific Coast Aggr. 7's, 1939[5]	9-30-32	4	6	
Pacific Coast Cement 6's[5]	9-30-32	42	.....	
Pacific P. C. com.	10-13-32	3	.....	
Pacific P. C. pfd.	10-13-32	21	40	1.62½ qu. Oct. 5
Pacific P. C. 6's, 1934	10-13-32	80	.....	
Pacific P. C. 6's, 1935	10-13-32	.....	94	
Pacific P. C. 6's, 1936	10-13-32	75	94	
Peerless Cement com.[1]	9-30-32	25c	50c	
Peerless Cement pfd.[1]	9-30-32	5	10	
Penn.-Dixie Cement com.	10-17-32	1	1¼	
Penn.-Dixie Cement pfd.	10-17-32	7¼	10	
Penn.-Dixie Cement 6's	10-15-32	50⅜ actual sale		
Penn. Glass Sand Corp. pfd.[27]	10-18-32	40	50	1.75 qu. Apr. 1
Penn. Glass Sand Corp. 6's[39]	10-14-32	72	76	
Petoskey P. C.	10-17-32	2¼	2¾	
Port Stockton Cem. com.[9]	10-13-32	No market		
Riverside Cement, A[9]	10-13-32	.....	5	
Riverside Cement, B[9]	10-13-32	.....	1	
Riverside Cement pfd.[9]	10-13-32	47	50	1.50 qu. Nov. 1
Sandusky Cement 6½'s, 1932-37[27]	10-18-32	70	80	
Santa Cruz P. C. com.	10-13-32	29	65	$1 qu. Oct. 1
Schumacher Wallboard com.	10-13-32	1.10	.....	
Schumacher Wallboard pfd.	10-13-32	3	.....	50c qu. May 15
Signal Mt. P. C. pfd.[47]	10-18-32	5	8	
Southwestern P. C. units[47]	10-18-32	150	175	
Southwestern P. C. com.[47]	10-18-32	25	30	
Southwestern P. C. pfd.[47]	10-18-32	75	80	$2 qu. July 1
Standard Paving & Mat. (Canada) com.	10-17-32	1¾	2	
Standard Paving & Mat. pfd.	10-17-32	.....	35	50c qu. Aug. 15
Superior P. C., A	10-13-32	28	30	27½c mo. Nov. 1
Superior P. C., B	10-13-32	.....	8¼	12½c Oct. 20
Trinity P. C. units[47]	10-18-32	35	40	
Trinity P. C. com.[47]	10-18-32	8	10	
Trinity P. C. pfd.[47]	10-18-32	30	35	
U. S. Gypsum com.	10-17-32	22½	25	40c qu. Oct. 1
U. S. Gypsum pfd.	10-17-32	101½	.....	1.75 qu. Oct. 1
Wabash P. C.[21]	9-16-32	5	9	
Warner Co. com.[10]	10-17-32	2½	3	
Warner Co. 1st 7% pfd.[10]	10-17-32	13	.....	1.75 qu. Apr. 1
Warner Co. 6's, 1944, w. w.	10-14-32	38	40	
Whitehall Cem. Mfg. com.[47]	10-18-32	15	20	
Whitehall Cem. Mfg. pfd.[47]	10-18-32	30	35	
Wiscon. L. & C. 1st 6's, '33[15]	10-18-32	25	30	
Wolverine P. C. com.	10-17-32	.....	3¼	
Yosemite P. C., A com.[9]	10-13-32	90c	1.10	

*Latest 1932 dividend.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler, Wick & Co., Youngstown, Ohio. [5]Smith, Camp & Riley, San Francisco, Calif. [6]Frederick H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central-Republic Bk. & Tr. Co., Chicago. [16]G. M. P. Murphy & Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hewitt, Ladin & Co., New York. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simonds & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [23]Howard R. Taylor & Co., Baltimore. [24]Richards & Co., Philadelphia, Penn. [25]Hincks Bros. & Co., Bridgeport, Conn. [26]Bank of Republic, Chicago, Ill. [27]National City Co., Chicago, Ill. [28]Chicago Trust Co., Chicago, Ill. [29]Boettcher-Newton & Co., Denver. [30]Hanson and Hanson New York. [31]S. F. Holzinger & Co., Milwaukee, Wis. [32]Tobey and Kirk, New York. [33]Steiner, Rouse and Co., New York. [34]Jones, Heward & Co., Montreal, Que. [35]Tenney, Williams & Co., Los Angeles, Calif. [36]Stein Bros. & Boyce, Baltimore, Md. [37]Wise, Hobbs & Arnold, Boston. [38]E. W. Hays & Co., Louisville, Ky. [39]Blythe Witter & Co., Chicago, Ill. [40]Martin Judge Co., San Francisco, Calif. [41]A. J. Pattison Jr. & Co. Ltd., Toronto, Canada. [42]Nesbitt, Thomson & Co., Toronto. [44]E. H. Rollins, Chicago. [45]Dunlap, Wakefield & Co., Louisville, Ky. [46]First Union Trust & Savings Bank, Chicago. [47]Anderson Plotz and Co., Chicago, Ill. [48]Hemphill, Noyes and Co., New York City.

Consolidated Sand and Gravel, Ltd. (Canada)

THE Consolidated Sand and Gravel, Ltd., Toronto, Ont., reports for the year ended March 31, 1932:

CONSOLIDATED INCOME (IN CANADIAN CURRENCY)

	1932	1931
Net operating profit	$ 187,163	$ 269,546
Depreciation and depletion	106,145	126,731
Balance	81,018	142,815
Other income	2,422	10,822
Total income	83,440	153,637
Administrative charges	40,387	89,325
Other deductions	1,050	3,875
Net income	42,003	60,437
Preferred dividends	75,754	76,742
Deficit	$ 33,751	$ 16,305
Earned per share, preferred	$3.91	$5.59
Number of preferred shares	10,742	10,822

CONSOLIDATED BALANCE SHEET

ASSETS

	1932	1931
*Property, equipment, etc.	$1,355,162	$1,424,961
Invested in associated companies	.....	12,010
Current assets:		
Cash	.....	34,691
Dominion government bonds	42,024	42,024
Accounts receivable (net)	30,587	39,958
Inventories	32,553	15.157
Standard Paving and Materials, Ltd.	62,420	36,651
Prepaid charges	18,903	18,704
Total	$1,541,649	$1,624,156

LIABILITIES

Preference stock	$1,074,200	$1,082,200
†Common stock	70,000	70,000
Mortgages payable	16,000	28,325
Current liabilities:		
Bank liability	2,369	.....
Accounts payable and accruals	16,356	36,404
Due associated companies	.....	17,327
Reserves	39,410	32,834
Capital surplus	304,173	304,173
Earned surplus	19,141	52,892
Total	$1,541,649	$1,624,156
Current assets	$ 105,164	$ 131,830
Current liabilities	18,725	36,404
Working capital	$ 86,439	$ 95,426

*Less reserves for depletion and depreciation: 1932, $465,663; 1931, $366,909. †Represented by 70,000 no par shares.

Alpha Portland Cement Earnings

THE REPORT of Alpha Portland Cement Co., Easton, Penn., for 12 months ended September 30, 1932, shows a consolidated net loss of $1,432,285 after taxes, depreciation, minority interest, etc., comparing with net loss of $382,975 for the 12 months ended September 30, 1931.

The balance sheet as of September 30, 1932, shows total assets of $27,533,748, comparing with $30,201,910 on September 30, 1931, and surplus (including $5,648,500 arising from reduction of stated value of common stock in 1931) of $5,948,459 against $2,694,547. Current assets, including $5,469,-(12 cash and marketable securities amounted to $7,901,548 and current liabilities were $306,860 on September 30, last, comparing with cash and marketable securities of $6,-609,331, current assets of $9,591,204 and current liabilities of $597,613 on September 30, 1931. Capital stock on September 30, last, consisted of 20,000 shares of 7% preferred and 711,000 no-par shares of common.

Consolidated income account for 12 months ended September 30, 1932, compares as shown below.

ALPHA PORTLAND CEMENT CO. CONSOLIDATED INCOME ACCOUNT

	1932	1931	1930	1929
Net sales	$4,210,575	$6,610,293	$10,294,030	$12,373,664
Operating expenses	4,543,294	5,732,968	7,706,667	9,132,009
Depreciation	1,398,048	1,393,521	1,383,594	1,266,721
Operating loss	$1,730,767	$516,196	*$1,203,769	*$1,974,934
Other income (net)	284,542	160,976	228,372	288,815
Loss	$1,446,225	$355,220	†$1,432,141	‡$2,263,749
Federal taxes	.....	27,755	152,124	274,404
Minority interest	‡13,940	.....	.....	.....
Net loss	$1,432,285	$382,975	*$1,280,017	*$1,989,345
Preferred dividends	140,000	140,000	140,000	140,000
Common dividends	355,500	888,750	1,777,500	2,133,000
Deficit	$1,927,785	$1,411,725	$637,483	$283,655

*Profit. †Income. ‡Credit.

Ross Island Sand and Gravel Co.

THE Ross Island Sand and Gravel Co., Portland, Ore., reports for the year ended December 31, 1931:

BALANCE SHEET OF THE ROSS ISLAND SAND AND GRAVEL CO.

ASSETS

	1931	1930
Property (less reserve)	$1,514,618	$1,546,223
Special deposits	17,420	17,786
Depletion installment	1,559	2,581
Investments not pledged	5,000	6,050
*Investments (pledged)	1,123,075	1,123,075
Current assets:		
Cash	1,381	1,618
Accounts receivable (net)	8,076	25,881
Inventories	31,439	26,738
Contract deposit	2,022	.....
R. H. Schneeloch liability	17,090	17,090
Deferred debits	60,791	66,884
Total	$2,782,470	$2,833,926

LIABILITIES

Preferred stock	$ 636,170	$ 636,170
†Common stock and surplus	1,511,567	1,572,222
Funded debt	492,100	503,600
Current liabilities:		
Notes and accounts payable	15,555	24,414
Deposits payable	1,559	2,581
Taxes payable	12,491	262
Salaries and wages payable	445	1,118
Accruals	12,756	12,261
Due others	41,210	46,445
Due to affiliated companies	41,197	17,104
Special deposit	17,419	17,748
Total	$2,782,470	$2,833,926
Current assets	$ 42,918	$ 54,237
Current liabilities	84,016	87,081
Working capital	(d)$41,098	(d)$32,844

*Pledged to secure funded debt. †After deducting operating loss, disposal of property, write-off of organization expenses, etc.

Lehigh Cement Earnings

THE Lehigh Portland Cement Co. reports for 12 months ended September 30, 1932, net loss of $1,329,328 after taxes, depreciation, depletion, etc. This compares with net profit of $482,352 equivalent to $2.35 a share (par $100) on 204,969 shares of 7% preferred stock for the 12 months ended September 30, 1931.

Florida Portland Cement Co.

THE Florida Portland Cement Co., Tampa, Fla., reports a balance sheet as of June 30, 1932, as follows:

ASSETS

	June 30, '32	Dec. 31, '31
Property and equipment, Organization expenses	$5,826,656	$5,116,564 / 691,884
Current assets:		
Inventories	†246,503	241,.45
Cash	391,890	421,.12
Accounts and notes receivable	207,810	198,334
Inventories and cash with trustee	57,303	24,558
Deferred charges	32,931	67,395
Total	$6,763,094	$6,761,491

LIABILITIES

Preferred stock	$4,997,100	$4,997,100
*Common stock	1,100	1,100
Bonded debt	1,488,000	1,488,000
Current liabilities:		
Accounts payable, etc.	43,032	33,415
Depreciation and depletion reserve	609,124	554,053
Deficit	375,262	312,175
Total	$6,763,094	$6,761,491
Current assets	$ 846,204	$ 861,091
Current liabilities	43,032	33,415
Working capital	$ 803,172	$ 827,676

*Represented by no par shares; 1932, 74,986; 1931, 75,000. †Including $33,094 cement in foreign countries.

In a recent letter, company asked holders of the first sinking funds 6½s due October 15, 1932, to deposit their holdings with the Central Republic Bank and Trust Co., Chicago, under a plan to extend the bonds to October 15, 1937. Depositing bondholders will receive, in addition to October 15, 1932, interest, $20 per $1000 bond in consideration of their willingness to extend their bonds. In the event the plan is declared non-operative prior to December 15, 1932, deposited bonds will be returned without October 15 interest coupons. Bonds deposited subsequent to the filing of notice to declare the plan non-operative will not be entitled to receive the consideration of $20 per $1000 bond referred to above and will be returned with October 15 interest coupons attached.

Pennsylvania-Dixie Cement Earnings

CONSOLIDATED PROFIT of the Pennsylvania-Dixie Cement Corp., New York City, before depreciation, depletion and interest for 12 months ended September 30, 1932, amounted to $329,453, against $895,392 in like 1931 period. After charges there was net loss of $1,659,864, against net loss of $1,149,688 in corresponding 1931 period. Current assets as of September 30, including $2,613,183 cash and short term securities, amounted to $5,110,344 and current liabilities were $246,827. This compares with cash and short term securities of $3,155,842, current assets of $6,277,755 and current liabilities of $357,358 a year ago.

Recent Dividends Announced

McNeel Marble Co. 6% 1st pfd. (qu.)	$1.50, Oct. 15
Riverside Cement Co. 6% pfd. (qu.)	1.50, Nov. 1

Ed. Shaw's News Letter from Los Angeles

A Project for the World's Most Complete Rock Products Manufacturing Plant

RECENTLY I had a pleasant visit with Aman Moore, who proposes to build the most complete rock products plant that has ever been built. Its products will be most of those in the rock products field, cement, lime, gypsum, crushed rock in all sizes from chicken grits up, magnesite, plastic and dead-burned, mineral fertilizers, and so on. It is intended to make three kinds of portland cement besides the standard kind; these are quick-hardening, white and marine cement, the latter being high in iron. The intention is to follow the stock yards motto, "Get everything that is in the critter, even the squeal." The squeal in this case is the waste gas of the kilns which it is proposed to use for making dry ice.

I have heard it said, even by some of those who understand the industry pretty well, that such an idea is "all hooey," and that such a plant could never be built. But, in my opinion, it is very far from being "hooey"; and it would be quite possible to build such a plant, although personally I hope it never will be. But, if you think it over it is only carrying to its logical conclusion what many cement-making companies are doing. Several of them are in the lime, gypsum or aggregate business. Several companies are using exit gases in waste-heat boilers, and it is quite logical to go one step farther and make dry ice of the gases. Nothing new in the way of either process or machinery will have to be invented.

I was shown the plans and there is nothing in them that is not found in other cement plants except for details of size and construction.

There are just two features that strike me as new in the recently revised plans which he explained to me. One is the use of a very long kiln, the other the method of converting the rock into slurry and pumping this to the plant. The kiln as proposed is 800x11½ ft. except that there would be two expanded portions where the diameter is 13 ft. at the hot end. The idea of the first of these is to hold the material in a calcining zone until the last of the CO_2 has escaped before the material goes into the enlarged clinkering zone. The temperature of the exit gases, even with this great length, would normally be about 450 deg., but it is hoped to bring them to a little over 200 deg. by the use of barriers of chains or other devices in the cold end of the kiln.

The design for these kilns has already been made and there is one unique feature, that of a double drive. The torque would be so great as to set up an undue strain if such a length of kiln were to be driven from only one point so two motors and gear systems would be provided with an arrangement by which the motors would always be synchronized.

Cooling would also be carried further than in most plants, in long coolers that would double back under the long kilns. It is expected that the incoming air would be preheated to 1000 deg. F., and that the clinker would be cool enough to be picked up by the fingers as discharged.

The kiln in which lime and magnesite would be burned and gypsum calcined and phosphate rock volatilized is differently designed. It would be a straight cylinder with no "soaking zones," as in the cement kiln, with only an enlarged portion. The cooler would continue in the same direction and discharge into dust-tight and air-tight storage. There would be a "Dutch oven" to prevent direct contact of the rock with the flame when gypsum is being calcined.

One important feature of the design is the elaborate dust-collecting system, which would include collection from every machine or from every point at which dust may originate. This system would be of the type that uses filter bags.

As one looks at the plans he is struck by the number of storage tanks and silos that would be included, but these are made necessary by the handling of so many different products. There would be well over 200 storage tanks and silos.

As to the proposal to pump the rock as slurry to the plant, that has been considerably studied and one installation, it is said, has been partly completed and would have been in operation by this time if the demand for cement had continued at what it was. It is feasible enough, although, speaking from some experience with pumping sand and gravel through long lines, I do not think it would be the most efficient method to adopt in many cases.

Believes Day of Business Dinosaurs Over

I do not in the least object to such plants on engineering grounds, but on sociological and economic grounds I seriously object to them. For I hope, as I find many others do today, that the Triassic-Jurassic period of business is passing, and that we shall see fewer and smaller dinosaurs of business until they finally become extinct. I believe experience is beginning to show that they were founded on delusions, the volume delusion, and the single management delusion especially.

That the volume delusion *is* a delusion is now beginning to be pretty well understood. Single management is equally delusive. It is not possible for one company to make and sell six unrelated products as cheaply as six companies, each specializing in one of them, can. There can be no such special knowledge at the head of one big company as there is with specialized companies, and the matters of sales contacts and other human relationships enter into business very deeply. A very thoughtful economist points out that a major difficulty that the civilized world is finding in its efforts to recover from the present depression is that its units are too big and unwieldly. If they are to run at all they must absorb an enormous amount in overhead. And most of us know of instances where small one man businesses are running steadily and making a little money while bigger businesses in the same line are shut down or eating up reserves and capital.

The dinosaurs of business largely evolved through stock market conditions, for it was an easy way to make money to unite a number of small concerns in a new company and issue stock that was sold to the public at twice its later proved worth. Let us hope that the day for such things is passing.

Legislation Is No Cure

UNDER the title, "You Can't Block the Wheels of Progress," the following appeared in the *Wheel*:

"Down an Indiana valley pioneer settlers built a toll road which put the primitive Indian canoes almost out of business.

"But their monopoly was not to endure, for other men soon built a barge canal parallel to the road. Notwithstanding frantic attempts to protect the rights of invested capital, much freight left the toll road and moved slowly and cheaply down the canal.

"Soon, however, toll road and canal were fighting a competitor known as the 'railroad.' The railroad proceeded to give the public such superior service that toll road and canal became obsolete.

"And now the old post road has burst into new life giving a flexibility and speed of transportation never enjoyed before and the railroad and interurban are joined in a frantic effort to strangle it, with all manner of excessive taxes and restrictions.

"Any attempt to make the stream of progress flow backward by legislative fiat is bound to fail. The public will not long permit any agency which renders them superior service to be crippled artificially and will soon learn that legislation aimed at trucks boomerangs at themselves in the form of higher cost of practically all commodities."

Hudson River Stone Corp. New Plant Inspected by Constructors and Engineers

SOME 178 GUESTS of the Hudson River Stone Corp., and O'Brien Bros. Sand and Gravel Corp., New York City, were taken from New York to Cold Spring, on the Hudson, by special train, October 12, to inspect the new quarry and crushing plant of the Hudson River Stone Corp. E. H. Paull, New York representative of ROCK PRODUCTS, one of the guests, describes the trip as follows:

"The special train of six cars—four diners and two chair cars—left Grand Central at 11 o'clock. We had refreshments and dinner on the train and when we arrived at Cold Springs we were met with a band and a fifty-mile gale. We were then taken to the top of the mountain, or the quarry floor, by cars and then walked down through the plant in company with the engineers of Lyons and Slaughtery, contractors, who explained the workings at each step.

"The quarry will be worked so that the floor will not be visible from the Hudson River. They will leave the side of the mountain as is and work out the rock from behind. The floor of the quarry is 300 ft. above the level of the river. The blasting will be done by the tunnel method, 3- by 4-ft. tunnels. They will tunnel in about 100 ft. and then end with a tee, drilling 100 ft. either way from the tunnel. The drilling is being done with mounted Ingersoll-Rand drills. It is likely that they will work the face in two benches after they get back farther and will then use either well drills or mounted drifters, drilling down-holes and toe-holes. They have made one shot already, the shot being supervised by Sam Russell of the duPont company.

"Truck haulage will be used in the quarry. At first they will use bodies of 8- or 10-cu. yd. side-dump and later they may go to 15-cu. yd. bodies, side-dump. The trucks will dump to an apron feeder, 7 by 15 ft. which has a speed of 12 ft. per minute. This apron speed can be controlled so that the crusher will work at a maximum.

"The capacity of the plant will be 5000 cu. yd. per ten-hour day. The quarry will be extended around the mountain until they get a face equal to that production. A feature of the plant design is that it is arranged in duplicate in most respects and it will be possible to cut the production down to 2500 cu. yd. per day by cutting out one side of the plant.

"The rock is fed from the apron to the primary crusher, which is a 56- by 72-in. Traylor jaw crusher. This machine will handle rocks up to 8 or 9 ft. in length and from 4½ to 6 ft. in cross-section. The discharge from this crusher is about 20 in. in diam. and goes down a vertical chute to the secondary crushers. These are two 30-in. gyratory crushers with discharge openings of 3½ in. and a capacity of 420 cu. yd. per hour each. The stone is then carried by a conveyor to two 6- by 16-ft. scalping screens with ¾-in. holes in the jacket and 2¾-in holes in the inner drum. Here the stone gets the first washing where water under a pressure of 250 lb. per sq. in. washes out the dirt and dust. Here, pieces of commercial size are diverted to one side and carried to the storage silos. About 40% is taken out at this point. Stone larger than commercial size comes out the end of the screens and falls through chutes to the four 4-ft. Traylor finishing crushers set with discharge openings of 1¼-in. The capacity of each is 110 cu. yd. per hour with 10-in. feed openings. From here the stone is carried by conveyor to 16 Niagara vibrating screens 4 by 7 ft. Rejects from the screens are carried back to the finishing crushers. The finished product is carried to silos, of which there are seven, the largest being 85 ft. in height and 40 ft. inside diameter. The capacity of the silos is 20,000 cu. yd.

"The plant has its own power plant with the silos through feeders which feed to conveyors and thence to trucks, railroad cars or river barges. A washing box is located ahead of each loading discharge so that all stone is washed before loading.

"The plant has its own power output with three McIntosh and Seymour oil engines of 660 hp. and 300 r.p.m. The generator end is of 625 kva. and 2300 volts. They use high tension motors of 2300 volts with the exception of the small motors which are 440 volts. They have independent motors for each piece of machinery and all motors are operated from a central switchboard. They are arranged so that if any motor stops all motors ahead of it stop automatically.

"One of the engineers stated that the plant is so arranged that the weight of rock on the conveyors keeps them moving and the synchronous motors charge back into the line. It is expected that the plant will be started about the middle of December."

R. F. C. Makes Loans for Waterworks

LOANS TOTALING $2,979,000 were approved October 12 by the Reconstruction Finance Corp. for eight self-liquidating projects in the states of Kentucky, Ohio, Illinois, Washington and North Carolina dealing with the purification of water supply and the construction and enlargement of municipal waterworks systems expected to provide a wide range of employment, it was announced by the board.

These loans drew particular interest of the R. F. C., corporation officials stated, since they not only provide a wide range of employment benefits over the country but because they deal with the purification of water supply. The addition of a filtration plant to a city water system, for example, means improved quality of water and health conditions.

The loans are: Wilmette, Ill., water supply system, $580,000; Seattle, Wash., improvements to water system, $1,491,000; Sandusky, Ohio, construct water system sludge basin, $77,000; Roanoke Rapids, N. C., construct water and sewerage system, $365,000; Conneaut, Ohio, additions, improvements to water supply system, $200,000; Columbia, Ky., to complete water supply system, $29,000; Maysville, Ky., construct filtration plant, water supply system, $47,000; Savanna (Ill.)-Sabula (Iowa), to complete toll bridge, $190,000; total, $2,979,000.

As of October 12, the directors of the Reconstruction Finance Corp. had authorized loans under section 201(a) in a total amount of $124,536,620.

Approximately 500 informal applications have been received by the R. F. C. for loans on self-liquidating public projects involving many different types of improvement works, including bridges, airports, docks, ferries, markets, power plants, sewers, terminals and water supply projects.

Only about 25% of the applications received, however, are eligible to borrow in accordance with the terms set forth in section 201-(a) of the Reconstruction Finance Act.

Funds will be advanced for the construction of eligible small projects just as readily as for the construction of large ones. The provisions of the act should be studied by every mayor and public official to determine whether there are projects which may be initiated in his community and financed through the R. F. C.

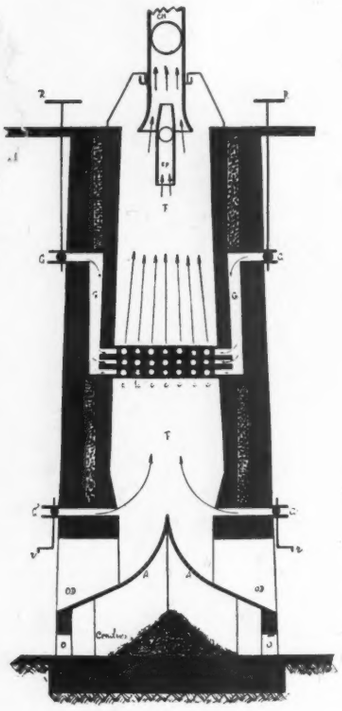
In making an application for a loan for a self-liquidating project, correspondence should be directed to the Engineers' Advisory Board, Reconstruction Finance Corp., in Washington. When a formal application is received by the board it is routed through the legal, engineering and financial departments of the corporation.

Examiners in these three divisions make their reports to the Engineers' Advisory Board. On the basis of these reports, the Engineers' Advisory Board makes a report and prepares a recommendation to the board of directors. On the basis of this report loans are authorized by the dicetors.

The corporation is willing to counsel with and answer correspondence of applicants for loans. The greatest relief will be extended to unemployment only through cooperative efforts on the part of public officials and the corporation.

Foreign Abstracts and Patent Review

Manufacture of Agricultural Lime. Joseph Deforge describes a modern natural draft vertical lime kiln and then deals with use and effect of lime in farming and with



Natural draft lime kiln

methods of testing soil for lime content.—*Revue des Materiaux de Construction et de Travaux Publics* (1932), nos. 270, 271, etc.

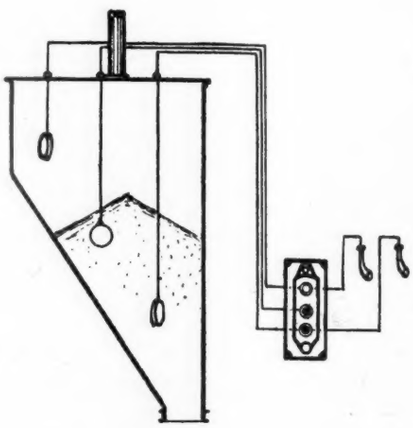
Steam Pressure Measurements of Portland Cement. F. Krauss and W. Schriever report on the examination of a few products created at different stages of burn in the production of portland cements as a sequel to the examinations of portland cement during dehydration by aid of steam pressure measurements. The experiments are also brought in relation to a few methods of examination and testing (Emley method) customary in portland cement chemistry. The report deals with: Decomposition of characteristic hydrated stages of burn from a rotary kiln; method of determination of free lime; and results in mixes and fusions, in various stages of burn from the rotary kiln; tests with the Gary thermograph; and determination of tensile and compressive strengths.—*Zement* (1932) **21,** 3, pp. 31-36.

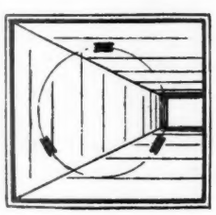
Fine Grinding of Cement. A. Eiger, in referring to his previous report on tests (*Tonindustrie-Zeitung,* 1931, No. 100) states that it seems to be confirmed repeatedly that strength of cement is obtainable, not with an exceedingly high content of very fine particles (below 4 to 5 microns), but with a content of as many medium granules as possible; that is, between 10 to 15 and 30 to 40 microns.

He presents seven charts giving curves showing the per cent. of different sizes of granules obtained in grinding cement in different mills. He concludes that an increase of medium size granules appears to result in mills with screening equipment.—*Zement* (1932) **21, 24,** pp. 348-349.

Improvements in French Cement Plant. The D'Origny-Sainte Benoite (Aisne) cement plant, enlarged and improved recently for production of Laitier (slag) cement, is considered a model cement plant. J. Prouteau describes the slag drier, a rotary tube inclined 5%, which dries slag at the rate of 40 tons per hour in parallel flow of the drying gases and the slag, the latter being "seized" by the hot and dry gases to prevent set. The sacking and sack conveying equipment is also described.

A signal device used on the sacking hopper is shown. It enables the operator of the sacking machine to ascertain at any moment the extent to which the hopper feeding the machine is filled. It consists principally of two cylindrical contact boxes comprising a cast iron case on which a flexible membrane is mounted. Under pressure of the material, this membrane bends and touches a carbon contact, thus closing a 14-volt electric circuit. These boxes are suspended from the overhead cover of the hopper by a tube, which serves as a conduit for electric wires.





Helps sacking machine operator

These wires terminate at a trunk containing two lamps, a red one corresponding to the upper box and a green one corresponding to the lower box. When the hopper is empty both lamps are extinguished; in filling the green lamp is lighted, and the red lamp indicates that the hopper is full. A medium indicating point is provided for in the device shown.—*Revue des Materiaux de Construction et de Travaux Publics* (1932) 270, pp. 89-96; 271, pp. 136-140.

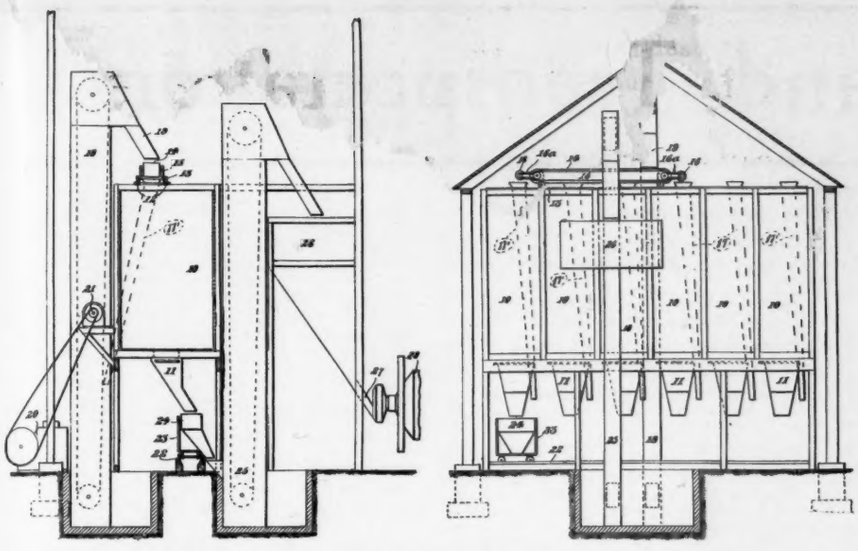
Improved Cement Shaft Kiln. O. Frey states that the high capacity shaft kiln for making cement has become an equal competitor of the rotary cement kiln. He describes the improvements in design of the plants of Buehler, Grueber, Humboldt-Kloeckner, Krupp-Andreas, and Pfeiffer, and the operating results; and then presents a summary of shaft kiln practice. The average heat consumption of the high capacity shaft kiln is 100,000 to 110,000 calories as compared to 140,000 to 150,000 calories in the dry process rotary kiln and 180,000 to 200,000 calories in the wet process rotary kiln.—*Zement* (1932) **21,** nos. 1 and 2.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Commissioner of Patents, Washington, D. C., for each patent desired.

Operation of Lime Kilns. The improvement consists in putting water, not steam, into the burning zone of the kiln. To do this the water must be cooled to the freezing point and other precautions taken to prevent it from being vaporized before it strikes the glowing limestone and coke. The inventor claims that there is an accelerated expulsion of carbon dioxide and that the water falling on the coke acts in a well-known manner to decrease fuel consumption. *Rudolf Clement and Walther Voss, Germany, Assignors to Vulcan-Feureung Aktiengesellschaft, of Cologne, Germany, U. S. Patent No.* 1,836,526.

Feldspathic Flux for Porcelain. At present makers of porcelain buy feldspars of different grades and make up their own flux by adding quartz, alkali or pure feldspar. The patent covers the method of making a definite flux composition which is ready to be used by the customer without the addition of anything. The feldspar is mined and analyzed and stored in one of several bins, according to its chemical content. The feed to the ball mill or pulverizer is drawn from these bins so as to make a mixture of the required analysis, the process being much the same as that of making a cement raw mix. Other bins are filled with quartz, alkali and other needed constituents which

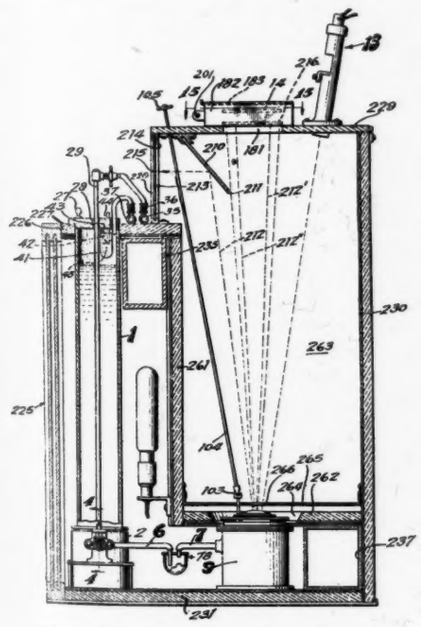


Longitudinal and transverse sections through feldspar flux plants

are added before grinding. Where biotite mica is present (which would spoil the flux if in any quantity) it is removed by magnetic separation.—*C. H. Peddrick and P. W. Lewis, assignors to United Feldspar Corp. of New York. U. S. Patent No.* 1,855,115.

Apparatus for Measuring Fineness of Finely Divided Materials. This device belongs to the class of apparatus which indicates the fineness of materials by recording the time they take to settle. Its advantage is the precise method of measuring the effect of settling and photograph recording. The tube in which the powder is settled is marked 1 in the illustration, and for cement it is filled with kerosene.

The pressure of the liquid in this tube varies with the amount of fine particles in suspension. As they settle out the pressure will decrease. So if there is a mixture of fine and coarse particles in the tube the pressure will decrease rapidly while the coarse particles settle out, then more slowly as the finer particles settle and very slowly as the finest particles settle. If these changes are recorded as a curve, the curve will show the proportions of coarse, fine and finest with great accuracy.



Time to settle determines fineness

In this device the pressure is transmitted to the cylinder 9 by pipes 6 and 7. In this cylinder are two mirrors, one fixed and the other moved by a bellows arrangement as the pressure decreases. A ray of light, shown by the dotted line coming from the tube 13, falls on these mirrors and is reflected by them to a photographic plate in the box on top of the apparatus. This plate is moved slowly by a screw as the settling goes on and the rate of settling is recorded as a curve, which can be interpreted as explained previously. The patent specification is detailed and shows many correcting devices by which the effects of temperature, vapor pressure and so on are minimized or obviated.—*R. T. Knapp, assignor to Riverside Cement Co., Los Angeles, Calif. U. S. Patent No.* 1,838,628.

Making Colored Cement. The raw cement material is mixed with such compounds as phosphates, borates or halogen compounds which are fluxed with heat into molten matter to which metal compounds such as the oxides of chromium, nickel, cobalt, copper and the like are added to color the clinker.

Two examples are given. In the first 100 kg. of cement raw material is mixed with 4 kg. fluorspar, 1 kg. borax and 0.5 kg. chromium oxide. This is burned to clinker in a kiln and ground in the ordinary way. In the second example the mix is of 100 kg. raw material, 4 kg. fluorspar, 1 kg. borax and 1 kg. coke. The first example when burned with an oxidizing flame makes a bright green cement, the second when burned with a weak reducing flame makes a terra cotta colored cement. Sodium phosphate may be used instead of borax; with both borax and sodium phosphate compounds like colored glass, as borosilicates, are formed with the metal oxides.—*G. Bergen, F. Engelhardt and R. Steckhan (Germany). U. S. Patent No.* 1,829,082.

Hardening and Waterproofing Composition for Lime Products. The specifications describe a composition to be added in making lime plaster, stucco and the like for waterproofing and accelerating final hardening.

It is made by mixing a special or standard waterproofing compound, such as lime combined with fat or fatty acids, calcium chloride and roll scale or iron filings. A carbonate may be added if desired.

Proportions given in one claim call for equal parts of each, the whole being not more than 10% of the calcium content. The inventor says that he has tried a number of single and double chlorides and other salts in the place of calcium chloride but finds calcium chloride to be the best. From 1 to 10% of the compound may be mixed with lime or other mortar material.—*Douglas M. Harrison, assignor to McKenzie Mortar Co., Pittsburgh, Penn. U. S. Patent No.* 1,829,746.

Dust Separator. The device illustrated is intended to remove the dust from air entering the carburetor of an internal engine. The stream enters a vertical circular chamber which gives it a swirl so that the dust particles will be thrown to the side. They follow the side down to a splitter (6) and pass with a small part of the air stream into a pocket where they are collected, the small amount of air not being able to lift them as it passes out.—*F. R. Simms and B. C. Joy, U. S. Patent* 1,838,117.

For carburetors

Concentration of Phosphate Bearing Material. This process is for removing iron and aluminum compounds from phosphate rock, especially Tennessee rock. The finely ground rock in a thick pulp (about 50% water) is first treated with hydrogen sulphide, about 35 cu. ft. to the ton of rock. Then a small quantity of soap or sodium oleate and creosote, pine oil or similar oil in very small quantity are added and part of the aluminum and iron compounds are floated off. Copper sulphate has also been added as a reagent. A retreatment of the concentrate by flotation removes another part of the iron and aluminum compounds as froth, for the reagents make a part of these compounds more easily flotable and another part less easily flotable.—*J. W. Littleford and F. J. Johnston, assignors to Mineral Separation, North American Corp., New York. U. S. Patent No.* 1,838,422.

Traffic and Transportation

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week ended October 15:

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

26973. **Lime and limestone,** in straight or mixed carloads, minimum weight 60,000 lb., between Falls Village, Conn., and Lee and West Stockbridge, Mass. Proposed, 5; present, various. Reason—Same rate as in effect between Canaan, Lee and West Stockbridge, Mass.

TRUNK LINE ASSOCIATION DOCKET

29898. **Crushed stone,** carloads (See Note 2), from York, Penn., to White Plain, Md., $1.25 per net ton. (To expire March 31, 1933.) (Present rate, $1.50.) (See Note 4.)

29901. **Ground limestone,** carloads, minimum weight 50,000 lb., from Grove and Frederick, Md.; Engle, Martinsburg and Millville, W. Va.; Stephens City and Strasburg Jct., Va., to Fairchance, Penn., 11c per 100 lb. (See Note 4.)

29882. **Ground limestone,** carloads, minimum weight 50,000 lb., from Howes Cave, N. Y., to B. & A. R. R. stations, Boston, Mass., to Athol, Mass., 16c; West Springfield, Mass., to Dalton, Mass., 15c, and Pittsfield, Mass., to Richmond Furnace, Mass., 13c per 100 lb.

29916. **Crushed stone,** carloads (See Note 2), from Upper Montclair, N. J., and Montclair Heights, N. J., to destinations on the Erie Railroad in Trunk Line Territory within the radius of 435 mi. based on the following mileage scale except to points where rates have been established to meet motor truck competition, rates in cents per net ton:

Miles	Rate	Miles	Rate
1 to 15	60	176 to 200	150
16 to 25	70	201 to 230	160
26 to 40	80	231 to 260	170
41 to 60	90	261 to 290	180
61 to 80	100	291 to 320	190
81 to 100	110	321 to 350	200
101 to 125	120	351 to 380	210
126 to 150	130	381 to 410	220
151 to 175	140	411 to 440	230

(See Note 4.)

29920. **Sand and gravel,** carloads (See Note 2), from Hanover, Va., to C. & O. Ry. stations, Louisa, Charlottesville, Waynesboro, Christian, Fordwick, Covington, Alleghany, Va., and various. Rates ranging from 81c to $1.54 per net ton. Reason—Proposed rates are comparable with rates from Massaponax, Va.

TRUNK LINE ASSOCIATION DOCKET

29921. **Sand** (other than blast, engine, foundry, glass, molding, quartz, silex or silica), carloads (See Note 2), from Philadelphia, Penn., to Linfield, Penn., 80c per net ton. (Present rate, 90c. (See Note 4.)

29922. **Ground limestone,** carloads, minimum weight 50,000 lb., from Bellefonte and Pleasant Gap, Penn., to Vineland, N. J., 14½c per 100 lb. (Present rate, 15½c per 100 lb.) Reason—Proposed rate is comparable with rate from Bellefonte district to Bridgeton, N. J.

29925. (A) **Sand, molding, silica,** carloads; (B) **sand, building, glass, engine; ground flint, quartz and silex,** in straight or mixed carloads (See Note 2), from Tatesville, Penn., to Toronto, Ont. (A) $3.70 per net ton and (B) $4.50 per net ton.) Reason—Proposed rates are comparable with rates from the Mapleton district.

29938. **Sand, common,** carloads (See Note 2), from Lewes, Del., to points of destination in Canada provided in Agent Curlett's I. C. C. A-306, taking following rate basis (in cents per 100 lb.):

Rate basis	Prop. rate	Rate basis	Prop. rate
80c	24	89	26
82c	24½	93c	27
84c	24½	100c	29
87c	26	100d	33

Reason—Proposed rates are fairly comparable with rates from Philadelphia, Penn.

29943. **Sand and gravel,** carloads (See Note 3), from Alfred, N. Y., to points in Pennsylvania:

	Prop.		Prop.
Gaines	$1.20	Potter Brook	$1.30
Nelson	1.20	Antrim	1.40
Middlebury	1.30		

Rates in cents per net ton. (See Note 3.)

29949. **Limestone, crushed,** carloads (See Note 2), from Greer, W. Va., to Clarksville, Penn., $1 per net ton. Present rate, $1.10 per net ton. Reason—Proposed rate is comparable with rates to Waynesboro, Penn.

CENTRAL FREIGHT ASSOCIATION DOCKET

33282. To establish on **crushed stone, agricultural limestone and agricultural limestone screenings,** in open top cars, carloads, from McVitty's, O., to Newcomerstown, O., $1.25 per net ton, emergency increase in addition. Present rate, 18c per cwt.

33283. To establish on **sand, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica,** in carloads (rate to apply only on Ohio intrastate traffic, when loaded in open top cars; when box car equipment is demanded by shipper, rate to be on basis of 115% of open car rates), from Glass Rock, O., only to Cambridge, O., 90c per net ton. Present rate, 110c.

33284. To establish on **agricultural limestone,** in box cars, carloads, minimum weight 50,000 lb., from Genoa, Martin, Danbury, Marblehead, O., to Benwood, Moundsville, New Martinsville, W. Va., 202c per net ton. Present, 230c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

33294. To establish on **stone, crushed** (in bulk, in open top cars), carloads, from Bridgeport, O., to Barnesville, O., 75c per net ton, subject to tariff of emergency charges. Present, $2.20 per net ton (sixth class). Route: B. & O. R. R. direct.

33302. To establish on **stone,** viz., rip-rap, carloads, from Van Antwerp, Ky., to Pomeroy, O., $1.95 per net ton, subject to emergency charge. Present, $4 (sixth class).

33303. To establish on **sand and gravel,** in open top cars, carloads, from Columbus and South Columbus, O., to Amanda, O., 80c per net ton, emergency charge in addition. Present, 90c. Intermediate to Stoutsville, O.

33304. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) or **gravel,** carloads, from Harbor Bridge, Penn., to Foxburg, Penn., 110c per net ton. Present, 120c. (Intermediate to Shippenville, Penn.)

33305. To establish on **crushed stone, crushed stone screenings, limestone, unburned, agricultural,** in bulk, in open top cars, carloads, from Maple Grove to Niles and North Jackson, O., 100c per net ton. Present, from Niles, O., 140c, and from North Jackson, O., 110c.

33306. To establish on **crushed stone, crushed stone screenings, agricultural limestone, unburned,** in bulk in open top cars, carloads, from Marble Cliff, O., to Kenova, Ceredo, Buffalo Creek, W. Va., $1.50; Lavalette, Wayne, W. Va., $1.60; Dunlow, W. Va., $1.70, and Williamson, W. Va., $1.80 per net ton. Present rates: To *Kenova, *Ceredo, *Buffalo Creek, Lavalette, Wayne and Dunlow, W. Va., $2.20, to Williamson, W. Va., $2.30 per net ton.

*Intermediate to Lavalette, W. Va.

33307. To cancel rates on **sand** (except blast, core, engine, filter, fire or furnace, glass, grinding or polishing, loam, molding or silica) and **gravel,** carloads, **minimum weight** in open top cars, published in P. R. R. Tariff 1118-B, I. C. C. F-2103, from Anderson, Ind., to C. C. C. & St. L. Ry. (White Water Division) stations, viz.: Alpine, Beesons, Connersville, Milton, Nulltown, Ind., 90c, Brookville, Harrison, Laurel, Metamora, Yellow Bank, Ind., 100c; Ashby, Cedar Grove, Longnecker and New Trenton, Ind., 110c, permitting class rates to apply in lieu thereof. Route: P. R. R., Hagerstown, Ind., C. C. C. & St. L. Ry.

33232. To establish on **crushed stone, sand and dust, coated with asphaltic cement** (the asphaltic cement content not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading), carloads, from Toledo, O., to points in Indiana, Michigan and Ohio, per illustrations shown, except to points within radius of 30 mi.:

(Representative list)	Proposed	Present
Arlington, O.	130	(1)
Fostoria, O.	107	(1)
Portage, O.	100	(1)

(1) Sixth class.

33235. To establish on **sand and gravel,** carload, from Cleveland, O., to Burghill, O., rate of 95c per net ton. Present, 115c.

33231. To establish on **crushed stone** and articles taking same rates, in open top cars, carloads (See Note 3), from Bellevue, O., to Cortland, O., rate of 115c per net ton, plus emergency charge. Present—18c.

SOUTHWESTERN FREIGHT BUREAU DOCKET

25699. **Phosphate, acidulated and ammoniated, and agricultural limestone,** between points in W. T. L. territory and points in the Southwest. To amend Rule 320-G of W. T. L. Circular No. 1-T and Rule 350-I of W. T. L. Circular No. 17-G, which provide for rating of one and one-half times Class E on fertilizer compounds, etc., L. C. L., by adding the following commodities: Phosphate, acidulated; phosphate, acidulated and ammoniated; limestone, agricultural. These commodities are used for identically the same purposes as are the commodities now listed and should, therefore, be given the same rate. The basis sought is already in effect on North Dakota intrastate traffic, and it is thought desirable to have this basis apply throughout Western Trunk Line territory.

25748. **Limestone, crushed or ground,** from Carthage, Mo., to points in Colorado. To establish from Carthage, Mo., rate of $2.50 to Holly, Colo., and rate of $2.80 per ton of 2000 lb. to Rocky Ford, Swink and Sugar City, Colo., on limestone, crushed (broken into pieces ranging up to 200 lb. weight) or ground, carloads (See Note 3). The sugar refineries use a considerable quantity of limestone. Carthage shipper cannot compete for this business owing to much lower rates from Colorado quarries. Shipper is confident that the proposed basis of rates will create considerable volume to these Colorado refineries.

25750. **Asphalt rock; stone, coated, crushed or ground,** from Texas points to Lincoln and Omaha, Neb. To establish a rate of $5 per ton of 2000 lb. on asphalt rock, natural or coated with not to exceed 5% of road oil, crushed or ground; stone, coated with not to exceed 5% of road oil, crushed or ground, in straight or mixed carloads, minimum weight marked capacity of car, but not less than 50,000 lb., from Blewett, Cline, Dabney, La Pryor, Pulliam and Whitesmine, Tex., to Lincoln and Omaha, Neb. Shipper states that the proposed rate to Lincoln and Omaha should develop considerable movement.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3339. **Sand, coated with tar or asphaltum,** carload (See Note 3), from Ottawa, Ill., to stations on connecting lines in I. R. C. territory. To establish joint line rates based 20c per ton over single line rates.

6881. **Limestone, agricultural,** in open top cars only (See Note 3), from Alton, Ill., to P. R. R. stations: Altamont, Ill., 98; Casey, Ill., 110; Collinsville, Ill., 80; Dennison, Ill., 121; Effingham, Ill., 105; Vandalia, Ill., 98, being proposed rates. Present rates, classification basis.

WESTERN TRUNK LINE DOCKET

8132. **Rock, asphalt, natural or coated** with not to exceed 5% of road oil; **stone, crushed or ground, sand, gravel, coated** with not to exceed 5% of road oil (See Note 3), from La Cygne, Kan., to all stations in Kansas. Rates: Present—Class rates. Proposed—To establish on Kansas state traffic the mileage scale of rates published in Item 235 of W. T. L. Tariff 210.

Supp. I to 4781-K. **Rock, asphalt, natural or coated** with not to exceed 5% of road oil, crushed or ground, carloads; **stone, coated** with not to exceed 5% of road oil, crushed or ground, carloads, from Kansas City, Mo., and Pixleys, Mo., to points in Kansas. Please refer to Docket Bulletin No. 3261 dated August 2, 1932, Docket No. 4781-K. The above proposal now covered by Docket 4781-K has been converted into Emergency Proposal No. 56-7.

Supp. I to 4781-L. **Stone, crushed, asphalt, coated, carloads, as described in Item 926-D of Supplement No. 44 to W. T. L. Tariff No. 91-F and Item No. 1050-D of Mo. Pac. Tariff No. 6172-E, from Kansas City, Mo., and Pixleys, Mo., to stations in Missouri.** Please refer to Docket Bulletin No. 3262 dated August 3, 1932, Docket No. 4781-L. The above proposal now covered by Docket 4781-L has been converted into Emergency Proposal No. 56-8.

U. S. Supreme Court to Pass on State Regulation of Motor Truck Carriers

CHIEF JUSTICE HUGHES has announced that the Supreme Court of the United States would take jurisdiction of an appeal brought to the highest court on behalf of several motor-truck operators of Texas to test the validity of a state statute providing for regulation of common and contract motor carriers. The case was assigned for argument on the court's call for November 14.

Appellants J. H. Stephenson et al., in Case No. 326, seek reversal of a Federal court decision which upheld the validity of the statute, on the ground that enforcement of its provisions deprives the contract carriers of their property without due process of law and denies them equal protection of the laws, in violation of the Fourteenth Amendment.

The operators assert that they are private contract carriers operating on the state highways. They brought an action to restrain enforcement of the statute which provides that the business of operating as a motor carrier of property for hire along the highways of the state is a business affected with a public interest.

As to private contract carriers, it prohibits their operation without permits, the State Railroad Commission being authorized to grant or refuse permits upon consideration of conditions prevailing as to existing service by common carriers and of the transportation and traffic structure. It also empowers the commission to fix the maximum or minimum rates to be charged by contract carriers and that such rates shall not be less than the rates prescribed for common carriers doing the same business.

Ruling of District Court

The District Court of the United States for the Southern District of Texas denied the operators' request for an injunction to restrain enforcement of the railroad commission's orders regulating their trucking business. In upholding the validity of the statute, the district court said it was "a clear, simple declaration of policy that the public has an interest in the business of carriage for hire over the highways of the state." The court found that the facts warranted enactment of the statute.

In their appeal to the supreme court the contract carriers contend that enforcement of the act will bring about a complete destruction of their respective businesses. They instituted and brought this action not only for themselves but on behalf of all contract carriers in Texas similarly situated.

Consider Problems of Construction Industry

DECLARING that orderly and healthy development of construction, freed from wide fluctuations, is essential to economic stability, the National Conference on Construction closed a two-day session October 14 by pledging itself "to encourage a step-by-step program aimed at renewing construction on a more stable basis, in the interest of the construction industry, the business community and the public."

The immediate problem, the Conference decided, is to hasten the restoration of confidence which will release private capital and credit into construction and other trade-invigorating channels. It was the opinion that scarcely less urgent is the related problem of "discovering practical ways and means for obtaining an orderly and balanced volume of construction, efficiently produced and reasonably adjusted to the country's needs."

To solve these problems, the Conference committed itself to a program coordinated locally and nationally with action of financial and other business interests, industries producing construction materials, and the groups engaged in building operations.

In a series of resolutions, the conference adopted in general the proposals of its five fact-finding committees, which deal with such questions as construction employment statistics, sound trade relations, seasonal operations, building codes, and simplification.

The resolutions also took up the question of the use of American materials in public works projects, credit bureaus, appraisals, a uniform mortgage act, defects in relationship among elements of the building industry, and bid peddling.

Virginia Bars Highway Materials from Outside the State

NO CONTRACTOR bidding on road work in Virginia can use any material from Maryland, North Carolina or Tennessee, according to an order issued by the state highway commission. A similar order was issued by the commission a few days ago in which contractors of those states were barred from bidding on Virginia contracts.

These retaliatory measures, it was explained at the office of the commission, were taken because of discriminatory action taken in those states against Virginia contractors or materials.

Henry G. Shirley, chairman of the commission, said that in his opinion the whole matter of barring contractors or materials of other states was wrong and shortsighted, and he hoped that negotiations now in progress between the Virginia department and departments of the other three states would result in abrogation of all these bans. However, until agreements to this effect are made, the order of the Virginia department would stand, he said.

No Real "Overproduction"

IMPROPER DISTRIBUTION of income and earnings throws consumption out of balance with production and helps cause depressions, according to Ernest T. Weir, chairman of the National Steel Corp., who addressed the conference of the Purchasing Agents Association of Pittsburgh. He said this is not Socialism, but sound capitalistic principle, adding that a better study of daily business by business men will produce facts which can be used to balance production with consumption.

"I am not discouraged at our failure to hold the position attained in 1929, because the fundamentals had not been studied, and it was only luck that brought us to the position recently described by Winston Churchill when he said: 'The United States in 1928 was near to solving the great problem which had baffled the world since its foundation. She had nearly bridged the gap between the consuming and the producing power,'" continued Mr. Weir.

"The world is not suffering from permanent over-production, for no one is satisfied with what he possesses and human wants are never-ending. We have an excess of production only because of the forced decrease in consumption and not because wants or requirements are decreased. Put living wages in the hands of our millions of unemployed men and women again and we will have no over-production.

"Much of this trouble comes from improper distribution of income and earnings. If either capital or labor secures a greater percentage of earings than it is eititled to, it will surely be penalized in time.

"Better balance between production and consumption can be accomplished as a result of study of daily business by business men and a realization that permanent profit can come only from a normal distribution of the income of all production."

Discussing the general situation, Mr. Weir made a plea for the elimination of unprofitable selling. It is by no means certain that goods sold at a loss are a gain to the purchaser in the long run; certainly they are not a gain to business in general, and if such sales continue for long there can be only one result, namely, lower wages and decreased purchasing power, as every failure has its effect on general business, he said.—*Wall Street Journal* (New York).

Pavement Finance and Traffic

A DISCUSSION of methods of financing city pavements and the several factors affecting such financing is given in Bulletin 32, recently issued by the American Road Builders' Association. The bulletin also contains a comprehensive discussion of traffic, giving data on requirements for various conditions and on the construction of safety zones, radii of curbs at intersections, and control and design of multiple intersections.

Cement Manufacturers Take Leading Part in Drive for Safer Highways

Will Give Society Benefit of Personnel Made "Safety Conscious"

THE CEMENT SECTION of the National Safety Council held its annual meeting in the Shoreham hotel, Washington, D. C., on Tuesday, October 4, with a small but representative group from all of the larger cement companies and many of the smaller companies operating in the eastern section of the United States. Among the leading executives present were Edward J. Mehren, president of the Portland Cement Association; B. G. Coyle, treasurer of the Missouri Portland Cement Co., and E. Posselt, vice-president of the International Cement Corp.

Chairman W. L. White, Jr. (Medusa Portland Cement Co., Cleveland, Ohio), opened the meeting with the reading of his annual report. Mr. White said in part: "While it is not considered patriotic to harp on the fact that we are going through a depression, I am going to barely touch on this subject. The cement industry, perhaps, has been scarred deeper in some respects than many other industries, but I am glad to say that the outlook is now much better than it has been for a number of years. But the situation we have faced has curtailed safety activities and affected our safety records.

"Let me recall a recent experience in the Medusa organization. A plant was closing down and during the last hour of operation a man was seriously injured in a marl field. This injury, we know positively, was caused entirely by his mental condition, brought about through worry about being out of work. Undoubtedly there are a number of incidents of this kind in the plants of our members. Since history began, prosperity and depression have been working in cycles, and our safety work will always have to be planned accordingly."

Mr. White then stressed the possibilities of the cement industry, with its large personnel trained in safety promotion, using some of its energies to broaden the scope of its activities and assist in reducing the number of accidents in the home and on the highways. He concluded with a résumé of the accomplishments of the safety campaign in the industry.

Officers Re-elected

Following Mr. White's report the annual election of the Cement Section was held. The report of the nominating committee which was presented by Fred B. Hunt (Nazareth Cement Co., Nazareth, Penn.) was accepted, resulting in the re-election of the entire group of officers as follows: W. L. White, Jr. (Medusa), chairman; David Adam (Lawrence), vice-chairman; A. J. R. Curtis (Portland Cement Association), secretary; Jack Dempster (Canada) editor, *News Letter;* A. R. Couchman (North American), chairman, poster committee; J. B. Zook (Great Lakes), chairman, program committee; H. A. Reninger (Lehigh), chairman, membership committee; Fred B. Hunt (Nazareth), chairman, engineering committee; members of the executive committee at large: C. P. Benner (Lehigh), W. W. Hamilton (Alpha), and W. M. Powell (Medusa).

W. L. White, Jr.

Following the election, the report of the poster committee was presented by Chairman A. R. Couchman. This report showed that 500 posters had been offered as appropriate for use and that 60 cement plant photographs were accumulated for poster use. During the first nine months of this year 2,605,000 posters were used by members of this section. This number is 90,000 greater than for the corresponding period last year.

A. J. R. Curtis, secretary of the Cement Section, presented a paper based upon statistical experience with accidents in the cement industry. He was satisfied as to the effectiveness of the present plans and methods, all of which focus on the education and training of personnel rather than on operating methods, processes or equipment. Rather than a new concept or plan, he said, what was obviously needed was to put more punch into safety work and to pursue it with greater thoroughness, because of changing conditions brought about by shorter working shifts, doubling up on jobs, fewer man-hours per barrel, breaking up of old organizations, etc.

Mr. Curtis then submitted a list of 14 pertinent questions for mill managements to answer for themselves to test the present effectiveness of their safety organizations.

Physical Examinations of Employes

R. B. Fortuin, assistant to general manager, Pennsylvania-Dixie Cement Corp., in commenting on physical examinations, stated his belief that the benefits accruing from such examinations of employes hardly could be exaggerated. It was his belief that the results were reflected not only in improved health and decreased absenteeism in the plant, but in community health as well. The Pennsylvania-Dixie Cement Corp. requires physical examination of employes and can testify to benefits to both employes and community.

F. H. Hunt, electrical engineer of the Nazareth Cement Co., suggested that the 14 questions submitted by Mr. Curtis be provided to the management of the various plants and after similar expressions the secretary of the section arranged to distribute these in the form of a questionnaire.

Miss Julia Weder, nurse of the Giant Portland Cement Co.; W. H. Baker of J. E. Baker Co.; Dr. C. E. Ogden of the Universal Atlas Cement Co., and others continued a helpful discussion on the general subject of physical examinations. Dr. Ogden was questioned on possible effects of cement dust on the health of cement workers. He said in part:

Cement Dust Does Not Cause Silicosis

"It is now quite well established that there is no real hazard so far as the manufacture of cement is concerned.

"Silicosis results only from the presence of silica in substantial quantities. As you are quite well aware, there is very little silica to contend with in either fin-

ished cement or its raw materials. This fundamental fact being established, we have an immediate reason why silicosis is unknown in the cement industry."

Commenting on his personal experience of 11 years working in cement dust, Jack Dempster, Canada Cement Co., Port Colborne, Ont., said:

"I am predisposed to asthma. This is of many years standing. The interesting fact is that it never attacks me at the plant but ceases while I am carrying on there. In the sack department, where I function, the dust is as dense as it can be found anywhere. My experience would tend to prove that this cement dust offers no aggravation to these respiratory disorders."

A paper by E. Posselt, vice-president of the International Cement Corp., on "Safety from the Executive's Standpoint," was abstracted in Rock Products, October 7 issue.

Jack Dempster (Canada Cement Co., Ltd., Montreal, Que.), presented a paper entitled "In the Wake of the News," in which he stressed the human side, the tragic side of accidents, which are so thoughtlessly passed over by the great majority of us as merely items of news, until they occur to those near and dear to us. He then expressed his conviction that the personnel of the cement industry should use their efforts to reduce accident in general as well as in cement mills.

Highway Safety

Maxwell Halsey, traffic engineer, National Bureau of Casualty and Surety Underwriters, New York, discussed "Building Safety into the Highway." His subject was not intended to have particular bearing on cement mill and quarry accidents but was rather in preparation for a discussion to follow on the organization of the proposed Safe Drivers League. Mr. Halsey said in part:

"Many newly constructed streets and highways have had worse accident records than the old ones which they replaced. Those who make the charge have not actually come forward with the facts to prove their case, but it is quite possible that the accident records would at least show the increase of which they speak. The fallacy in their statement, however, lies in calling the new roadways 'more safe.' It is true that they would have been 'more safe' if the speed and volume of travel to which the older types of roads were subjected had continued, but such has not been the case. Let us consider briefly the recent changes.

"The mere cutting down of hills, the rounding of curves and the widening of highways only served to tempt the insatiable thirst for increased mobility and higher speeds. Thus we have the situation today where the motorist has been provided with an inexpensive car capable of high economical and comfortable speeds and with a road surface, and in most instances curves and hills capable of standing it. Yet comparatively little has been done to make these roadways safe for the speeds at which they are being used and will be used in the future.

"The number of vehicles has increased much more rapidly than the ability of the roadway capacities to care for them. And the individual is a much more difficult factor with which to deal than either the vehicle or the roadway, and thus today he is found to be responsible for approximately 85% of the accidents. The more opportunities there are for accidents, or rather actions which result in them, the more you will have. For this reason, in your cement plants you keep your dangerous moving parts covered up. It is likewise true that if individual drivers were courteous and gave the other driver his rights, traffic control at many intersections would be unnecessary. However, such is not the case, and officers, signals, channelizing, islands and rotary traffic are necessary to force him to do what he should know enough and be fair enough to do instinctively."

Mr. Halsey also pointed to numerous devices now being built into highways to secure a higher degree of safety.

"The Portland Cement Association's Safe Drivers League" was the subject of the next paper, by **W. W. Hamilton,** safety director of the Alpha Portland Cement Co., Easton, Penn., who said in part:

Alpha Cement's Safe Drivers' League

"Three years ago the Alpha Portland Cement Co. decided to accept its portion of the responsibility for reducing automobile accidents and organized an active safety campaign among its salesmen and operating men whose duties required them to use automobiles.

"The handling of a safety campaign for a sales organization is more difficult than it is for a mill, due to the fact that the men are widely scattered and work alone. In our case we have approximately 100 salesmen on the road who cover 30 states. It can readily be seen that the success of such a safety campaign depends entirely on the individual.

"The Alpha sales organization is divided into districts, and in our safety work we pit these districts against each other just as we do the mills, the basis for comparison being the number of accidents per 100,000 miles traveled. Bulletins are issued monthly showing the standing of the districts. These bulletins also contain a description of one or more accidents occurring during the month, which are considered significant, as well as remarks pertaining to these accidents or to safety in general.

"This plan, comparatively simple as it may seem, has brought about results which make it worthy of continuance. The second year of the campaign showed a reduction of 37% in the number of accidents over that of the previous year, and our record to date this year indicates that 1932 will be better than either of the two previous years.

"A study of the accident reports turned in by our salesmen during the past three years has convinced us that very few traffic accidents are caused by defective mechanism. Most of them are due to the driver and not to the machine.

"Of all the many causes of traffic accidents, we sincerely believe that the lack of common courtesy is responsible for more than 50% of all accidents. There seems to be a deterioration of character which affects many people as soon as they take their position behind a steering wheel.

"The majority of drivers who commit these and other flagrant discourtesies would not commit them otherwise. Something happens to them when they drive. How many men shove themselves ahead of the line at a ticket window? How many while walking deliberately blind others with a flashlight? How many deliberately block the path of a woman? How many walkers, at crossings, shove other walkers into the gutter?

"A natural resentment often prompts us to resent the attempts of discourteous drivers who disregard our rights. Common self-respect causes us to assert our just claim. But this, too, merely results in risk to life and property.

"Increase road courtesy and you will decrease traffic accidents! This is the golden opportunity that awaits the cement industry's Safe Drivers' League."

Rewards for Safe Drivers

The consideration of eliminating motor vehicle accidents affecting the cement industry and its employes was continued with a paper entitled "Methods of Safe Driving" by **A. R. Couchman,** safety director, North American Cement Corp., Martinsburg, W. Va. Mr. Couchman's paper was in part as follows:

"In the organization I represent, the North American Cement Corp., we have a safe drivers league. The promotional work which we have done in this connection has accomplished results both with our own operators and our employes who drive privately owned cars.

"More than 18 months ago we started a campaign on safe driving. Since that time we have not had a single accident among our fleet of motor vehicles which resulted in personal injury. We classify our automobile accidents under the following heads: Personal injuries, property damage and public liability. Districts have been designated and the mileage driven in each district since the last accident stimulates competition in safe driving among

our various operators. If an accident occurs under any one of the above mentioned heads, the district in which it occurs loses its accumulated mileage and must start over again.

"As an individual incentive, as well as an award of merit, we contemplate issuing a safe driver's certificate to our drivers who have driven a year with no accidents. This certificate will be placed on the dash of each car and will remain there as long as the driver maintains his safe driving record. This certificate will not only identify the driver as a member of the safe drivers league but it will signify that he is a safe driver and stands out as a challenge for him to maintain safety in driving."

At the conclusion of Mr. Couchman's paper there ensued a general discussion on the formation of a "Safe Drivers League" as a means of reducing accidents to company-owned and employe-owned automobiles and trucks. Chairman White pledged his best efforts to get such an organization into operation and, in conformance to a motion unanimously passed by the section members, became the chairman of a special committee to put the idea over.

The entire personnel of the "Safe Drivers League" committee of the Cement Section is as follows: W. L. White, Jr. (Medusa), chairman, W. W. Hamilton (Alpha), Gordon C. Huth (Universal Atlas), A. R. Couchman (North American), R. B. Fortuin (Pennsylvania-Dixie), David Adam (Lawrence) and Jack Dempster (Canada).

Otho M. Graves Elected Chairman, Quarry Section, National Safety Council

OTHO M. GRAVES, past-president of the National Crushed Stone Association, and president of the General Crushed Stone Co., Easton, Penn., was elected general chairman of the Quarry Section of the National Safety Council, at its recent annual meeting in Washington, D. C. Other officers elected were as follows: Vice-chairman, S. M. Shallcross, American Lime and Stone Co., Bellefonte, Penn.; secretary and *News-Letter* editor, Ralph Dinsmore, Warner Co., Philadelphia, Penn.; poster committee chairman, H. F. Yotter, the General Crushed Stone Co., Easton, Penn.; publicity committee chairman, J. R. Boyd, National Crushed Stone Association, Washington, D. C.; statistics committee chaiman, W. W. Adams, United States Bureau of Mines, Washington, D. C.; members at large: V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.; William H. Baker, J. E. Baker Co., York, Penn.; R. E. Colville, United States Gypsum Co., Chicago, Ill.; Norman G. Hough the National Lime Association, Washington, D. C.; A. L. Worthen, the Connecticut Quarries Co., Inc., New Haven, Conn.

In the absence of John Prince, general chairman, and W. M. Andrews, vice-chairman, the meeting of the Quarry Section was called to order by **V. P. Ahearn,** secretary of the section, who presided throughout the two sessions.

Otho M. Graves

Report of the Committee on Statistics

W. W. Adams: "The committee on statistics furnished quarry-accident data to the home office of the National Safety Council in Chicago for publication in the 1932 edition of the council's yearly report entitled 'Accident Facts.' The information supplied to the council was for the calendar year 1931.

"Employment in the quarrying and related industries was more than 30% lower than the previous year's level, according to records covering identical companies that were active in both years. These companies represented 9,300,000 man-hours of employment in 1931. Accident-frequency at these plants was reduced about 8%. Accident-severity increased in 1931, but the rates are hardly comparable because they are too greatly influenced by an increase or decrease of one fatality.

"Figures of larger scope which have become available for quarries and associate work since the early returns were furnished to the National Safety Council show that the accident rate per million man-hours of exposure remained about as it was in the previous year, but that the number of men employed declined approximately 10% and the number of man-hours of work performed declined 25%."

Wesley M. Graff, director, safety engineering division, National Bureau of Casualty and Surety Underwriters, New York City, presented a paper entitled "The Determination and Control of Compensation Insurance Rates."

S. M. Shallcross, vice-president of the American Lime and Stone Co., Bellefonte, Penn., discussed Mr. Graff's paper. He said he had studied the Pennsylvania Manual and the methods used by the Rating Bureau in determining rates, and he had not been able to come to any final conclusions regarding them.

W. W. Adams, chief statistician, Demographical Division, U. S. Bureau of Mines, Washington, D. C., and chairman of the statistics committee of the Quarry Section, presented a paper entitled "Recent Progress of Safety in the Quarry Industries." Incidentally, Mr. Adams stated, he was deviating slightly from the usual custom of discussing safety developments during the preceding year, choosing instead to cover the past nine years because of the remarkable strides made in the work during that period. [Mr. Adams' paper was abstracted in Rock Products, October 8.—Editor.]

A. L. Worthen, past general chairman of the Quarry Section, vice-president of the Connecticut Quarries Co., New Haven, Conn., in introducing the new officers said:

"I am happy to announce that Mr. Graves is our next chairman, for two reasons—first because he is a personal and close friend of mine, and second because we were able to prevail upon him to accept the nomination. He was reluctant to do so, not because of lack of interest in the work, but because of demands upon his time. I think it is true that he has

attended all of the meetings of the executive committee since I have been attending them.

"I think we are also fortunate in the selection we have made for vice-chairman. Mr. Shallcross is keenly enthusiastic concerning the possibilities for the Quarry Section and has many ideas as to what the section can accomplish. I think, with these two men, the hope expressed in Mr. Colville's letter will be realized during the coming year."

H. D. Immel, safety executive, Pennsylvania Department of Highways, presented a paper entitled "The Economic Necessity for Community Safety Work and Its Relation to the Quarry Industries," which was abstracted in Rock Products, October 8.

Should Promote Community Safety Work

S. M. Shallcross discussed this paper, a brief abstract being: that Mr. Immel's paper was a model of terseness and would justify spending much time studying every individual sentence ,that if the high cost of accidents in quarries was to be prevented, it could not be done by the quarry industry alone, that the matter of community safety was involved.

Mr. Shallcross said that here was a threat, an opportunity and a promise that taxes can be reduced if business will get back of the community safety program, and a threat that unless the public takes the safety program seriously, the state must protect the public against itself by a program involving expansion of state organizations and the adoption of many forms of social legislation.

"Why advocate a county or community safety council in preference to building up our state organizations?" said Mr. Shallcross. Then he answered the question by saying, "because the first requisite of successful accident prevention is favorable public opinion, and the second requisite is militant public opinion. On the other hand, when the problem of accident prevention is placed in the hands of state officers, the public says, 'It is their problem. They are paid to prevent accidents,' and serene in this thought go to their doom."

Concluding, after reading a number of specific suggestions in regard to community safety work with particular reference to automobile accidents, Mr. Shallcross said: "Probably most of the companies represented by the Quarry Section are located, by the nature of their business, in small communities. It should be easier to establish a community safety council in a small community than in the large city, with its diversified interests and problems. Start with a community safety council, then expand into a township safety council, and later into a county safety council.

"I suggest that the Quarry Section request its executive committee to make, as one of its major projects, the establishment of one or more community safety councils by its members during the coming year."

Otho M. Graves, as newly-elected chairman of the section, addressed the meeting in part as follows:

"Speaking seriously for just a moment, I have been convinced for some time that we are not doing the work that the Quarry Section could rightly do. Our individual members are making admirable records, but not because of any stimuli that flow from the Quarry Section. We, as a group, have been helpful to only a limited degree—not to a greater extent because we haven't known just what to do. We have wanted to help. We get enthusiastic at the annual meetings once a year, which freshen our spirits and kindle our enthusiasm. Another particular feature of these annual gatherings—only the old guard seems to attend. We talk to those who don't need to be talked to. We are most interested, but we need it the least. We are all stimulated by the intellectual value of the addresses we hear, but we want others in here who are not now receiving the benefits of these talks. We are not reaching the people we should reach. One way of getting around that is to stimulate their interest and get them into these annual gatherings. I talked with Mr. Shallcross on the subject last night, and he told me so many things so quickly that I flew for relief. He has a good many ideas.

"The intent is to set before the executive committee a crystallized program for the Quarry Section which I hope will be serious, real and definite in its purpose and susceptible of real achievement. It will be submitted to the members of the section. If we can perform a really definite, honest service for the industries comprising this section, our membership will take care of itself. I am rather hopeful that something can be done the coming year—just what it is we will have to trust to circumstances to develop as time goes on. I can assure you that we intend to do the very best we can for every industry that forms a part of this section."

The feature of the afternoon program was divided into two sections. The subject for discussion was "The 1931 Safety Contest and What We Achieved Through Participation." The National Crushed Stone Association was represented by **M. V. Miller,** vice-chairman, Berkeley plant safety committee, North American Cement Corp., Martinsburg, W. Va., who as the winner of the trophy for the crushed stone industry, presented a prepared paper which will be abstracted in a later issue.

Ralph Dinsmore, personnel manager, Warner Co., Philadelphia, Penn., spoke for the sand and gravel industry as representing the winning company of the National Sand and Gravel Association's safety contest. Mr. Dinsmore's paper will be abstracted in a later issue.

Accident-Prevention of Quarrying in California in 1931

THE stone-quarrying industry of California, including such related activity as rock-crushing, rock-dressing and the manufacture of cement and lime, conducted its operations during the calendar year 1931 with 5,981,014 man-hours of labor. In connection with these operations 74 lost-time accidents occurred among the employes for each million man-hours during which the men worked. This accident rate was revealed by a study of reports which the United States Bureau of Mines received through cooperation with the quarry companies and the California Industrial Accident Commission. The rate for 1931 was about 4% higher than for the previous year.

The reports showed that 122 quarries were in operation during all or part of the year and that the number of men employed was 3328, of whom 1361 worked in the quarries and 1967 worked at the cement mills, rock-dressing plants or on other work outside the quarries. The employes worked 771,336 man-shifts, an average of 232 shifts per man. Most plants worked on an 8-hour-a-day basis, but 7¾ hr. was the weighted average length of shift throughout the state. The average employe worked 1797 hours during the year, approximately 15% less than in 1930. Accidents resulted in 4 deaths and 436 nonfatal lost-time injuries.

Accident figures for other states are being prepared on a uniform basis by the Bureau of Mines so that comparable accident rates may be available for the quarrying and related industries in all states for use in accident-prevention work.

Takes Over Old Gravel Property

ARTICLES of incorporation have been filed by the Mercer Sand and Gravel Co. of Trenton, N. J. Col. Stephen H. Barlow, William A. Moore and Jack S. Bernstein are the incorporators.

The company has acquired a tract of land near Morrisville, Penn., formerly operated by the National Sand and Gravel Co. Colonel Barlow will act as president of the new concern, Mr. Moore as vice-president and Mr. Bernstein as treasurer.

One Man Who Did Not Invent Ready-Mix Concrete!

JOHN A. PEABODY, Seattle inventor who claims that he perfected the ready-mixed concrete process now employed by the Pioneer Sand and Gravel Co., has lost his suit for $496,000 against that concern, according to the *Seattle* (Wash.) *Star*. Superior Judge Kazis Kay refused to allow his claim. Announcement of the suit was made in the July 16 issue of Rock Products.

Cement Industry in 1931

Final Government Figures Show Cement Shipments Were 20% Less Than in 1930

PRODUCTION of portland cement in 1931—125,429,071 bbl.—showed a decrease of 22% from 1930; of nearly 29% from 1928, the highest year of production; and is the lowest recorded since 1922, according to statistics just made available by the U. S. Bureau of Mines.

Shipments of portland cement from mills in 1931 amounted to 127,150,534 bbl., valued at $140,976,450, a decrease of 20% in quantity and of more than 38% in gross value. The average factory price per barrel in bulk in 1931 was $1.11, a decrease of 33 c. per bbl. as compared with 1930.

Producers' stocks of portland cement at the mills on December 31, 1931—24,177,159 bbl.—showed a decrease of 7% from the large stocks on December 31, 1930, the only decrease recorded in stocks at the end of any year since 1922. They represented, however, the greatest stocks at the mills at the end of any year, except 1930, during which official statistical records of stocks have been kept.

The commercial capacity for production of finished portland cement of the 160 shipping plants in 1931, and of five plants inactive in 1931 but producing within the four previous years, according to manufacturers' reports supplemented by a few estimates, was 271,850,000 bbl. This total includes increased capacity due to extensions and improvements at old plants. There were no new plants reported as entering production in 1931. The total production for 1931 was 46.1% of the indicated capacity at the close of the year; the corresponding figure for 1930 is 59.7%.

A summary of the monthly estimates of output of portland cement in 1931, compiled from monthly reports of the producers, was published early in January, 1932, by the Bureau of Mines (Rock Products, February 13). These estimates, which indicated a production of 124,594,000 bbl. and shipments of about 126,465,000 bbl., were within 0.7% and 0.5%, respectively, of the final figures for 1931.

IMPORTS* OF HYDRAULIC CEMENT IN 1930 AND 1931, BY DISTRICTS

District	1930 Barrels	1930 Value	1931 Barrels	1931 Value
Florida	3,450	$3,828	1,213	$1,853
Hawaii	11,344	13,761	39,665	41,559
Los Angeles	155,234	120,153	4,983	9,249
Me. and N. H.	2,190	5,820	336	1,027
Maryland	180	213	4,000	6,000
Massachusetts	216,490	274,235	51,842	58,697
Michigan	.....	.....	8	24
New Orleans	4,700	5,620	.....	.....
New York	202,897	232,999	200,038	221,595
Oregon	3,000	3,588	.....	.....
Philadelphia	155,047	178,401	8,797	10,478
Porto Rico	214,549	290,344	146,333	157,378
San Antonio	6,300	6,429	.....	.....
San Francisco	127	326	.....	.....
Vermont	38	96	23	58
	975,546	$1,135,813	457,238	$507,918

*The value of imported cement represents the foreign market value at the time of exportation to the United States.

In addition to the imports shown there are also reported "imported for consumption white nonstaining portland cement": in 1930, 9261 bbl., valued at $18,749; in 1931, 12,360 bbl., valued at $27,855.

PORTLAND CEMENT MANUFACTURING CAPACITY OF THE UNITED STATES BY COMMERCIAL DISTRICTS, 1930 AND 1931

District	Estimated capacity (barrels) 1930	Estimated capacity (barrels) 1931	Percentage of capacity utilized 1930	Percentage of capacity utilized 1931
Eastern Pennsylvania, New Jersey and Maryland	56,019,000	56,380,000	62.7	50.8
New York and Maine	19,009,000	19,009,000	59.7	54.2
Ohio, Western Pennsylvania and West Virginia	28,652,000	28,863,000	61.5	40.1
Michigan	19,241,000	19,235,000	59.8	31.9
Wisconsin, Illinois, Indiana and Kentucky	31,393,000	31,393,000	64.4	48.3
Virginia, Tennessee, Alabama, Georgia, Florida and Louisiana	26,491,000	27,021,000	48.6	45.5
Eastern Missouri, Iowa, Minnesota and South Dakota	24,242,000	24,242,000	68.9	53.5
Western Missouri, Nebraska, Kansas, Oklahoma and Arkansas	17,883,000	18,330,000	70.0	50.1
Texas	10,359,000	10,579,000	65.5	58.5
Colorado, Montana, Utah, Wyoming and Idaho	6,769,000	6,812,000	33.5	32.5
California	22,405,000	22,405,000	45.2	34.5
Oregon and Washington	7,581,000	7,581,000	54.0	39.7
	270,044,000	271,850,000	59.7	46.1

SHIPMENTS OF DOMESTIC PORTLAND CEMENT FROM MILLS INTO STATES AND PER CAPITA, 1930 AND 1931, IN BARRELS*

State	1930 Total	1930 Per capita*	1931 Total	1931 Per capita*
Alabama	1,273,632	.48	1,250,778	.47
Arizona†	462,560	1.06	438,135	.99
Arkansas	1,459,388	.79	1,223,213	.66
California	9,426,837	1.66	6,616,135	1.13
Colorado	843,983	.81	775,540	.74
Connecticut†	1,754,324	1.09	1,476,613	.91
Delaware†	373,672	1.57	347,423	1.45
District of Columbia†	1,078,729	2.22	1,249,676	2.55
Florida	1,056,549	.72	764,671	.51
Georgia	1,561,775	.54	1,714,033	.59
Idaho	311,800	.70	189,317	.42
Illinois	11,164,248	1.46	7,925,435	1.03
Indiana	4,927,894	1.52	3,880,234	1.19
Iowa	6,411,595	2.59	3,799,665	1.53
Kansas	2,398,123	1.27	2,131,790	1.13
Kentucky	1,695,202	.65	1,628,002	.62
Louisiana	2,892,404	1.38	3,906,467	1.84
Maine	835,795	1.05	527,376	.66
Maryland	2,555,386	1.57	2,013,929	1.22
Massachusetts†	3,090,962	.73	3,043,584	.71
Michigan	8,625,691	1.78	5,582,116	1.13
Minnesota	3,668,645	1.43	3,716,068	1.44
Mississippi†	619,649	.31	524,804	.26
Missouri	6,145,380	1.69	4,259,370	1.17
Montana	319,214	.59	263,119	.49
Nebraska	1,675,904	1.22	1,903,200	1.38
Nevada†	147,243	1.62	133,403	1.45
New Hampshire†	559,958	1.20	437,493	.94
New Jersey	6,536,136	1.62	5,065,654	1.23
New Mexico†	298,111	.70	264,507	.62
New York	20,147,426	1.60	19,755,653	1.55
North Carolina†	1,165,162	.37	1,015,225	.32
North Dakota†	337,888	.50	258,072	.38
Ohio	9,698,510	1.46	6,644,895	.99
Oklahoma	3,396,549	1.42	2,213,685	.91
Oregon	1,070,341	1.12	926,874	.96
Pennsylvania	13,795,600	1.43	7,922,885	.82
Rhode Island†	704,943	1.03	569,817	.82
South Carolina†	1,654,951	.95	2,250,646	1.29
South Dakota	540,867	.78	637,023	.91
Tennessee	2,410,519	.92	1,396,425	.53
Texas	6,417,951	1.10	5,684,691	.96
Utah	417,472	.82	311,212	.61
Vermont†	582,495	1.62	312,492	.87
Virginia	1,648,052	.68	1,596,041	.66
Washington	3,102,088	1.98	2,086,795	1.32
West Virginia	1,598,843	.92	1,421,369	.81
Wisconsin	4,974,591	1.69	3,977,652	1.34
Wyoming	178,873	.79	136,273	.60
Unspecified	15,865	.....	235,182	.....
	158,029,775	1.29	126,404,657	1.02
Exports reported by manufacturers but not included above‡	1,029,559	.....	745,877	.....
Total shipped from cement plants	159,059,334	.....	127,150,534	.....

*Per capita figures based on latest available estimates of population made by the Bureau of the Census.
†Non-producing state.
‡Includes shipments to Alaska, Hawaii and Porto Rico.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN 1930 AND 1931*

Exported to—	1930 Barrels	1930 Value	1931 Barrels	1931 Value
Canada	51,367	$204,913	27,512	$103,942
Central America	176,397	436,015	88,360	189,821
Cuba	66,258	168,345	35,800	83,683
Other West Indies and Bermuda	53,017	116,064	31,620	55,435
Mexico	126,803	370,612	39,191	128,170
South America	233,593	877,434	178,439	497,528
Other countries	48,343	281,132	28,731	162,021
	755,778	$2,454,515	429,653	$1,220,600

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO IN 1930 AND 1931†

Exported to—	1930 Barrels	1930 Value	1931 Barrels	1931 Value
Alaska	23,957	$63,970	14,699	$29,699
Hawaii	266,990	679,756	270,373	671,858
Porto Rico	54,193	100,547	68,064	94,733
	345,140	$844,273	353,136	$796,290

*The value of exports of domestic cement is the actual cost at the time of exportation in the ports of the United States whence they are exported, as declared by the shippers on the export declarations.
†Compiled from records of the Bureau of Foreign and Domestic Commerce.

IMPORTS AND EXPORTS
(Compiled from records of the Bureau of Foreign and Domestic Commerce)

IMPORTS* OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS IN 1931

Imported from	District into which imported	Barrels	Value
Belgium	Florida	604	$990
	Massachusetts	51,842	58,697
	New York	27,909	29,412
	Porto Rico	18,847	25.157
	Total	99,202	$114,256
Canada	Maine and N. H.	336	$1,027
	Michigan	8	24
	Porto Rico	1,011	1,130
	Vermont	23	58
	Total	1,378	$2,239
Cuba	Maryland	4,000	$6,000
	Porto Rico	2,750	4,138
	Total	6,750	$10,138
Denmark	New York	61,242	$68,634
	Porto Rico	123,725	126,953
	Total	184,967	$195,587
France	New York	649	$1,485
French Indo-China	Los Angeles	1	$5
Germany	Los Angeles	4,978	$9,231
Japan	Hawaii	39,665	$41,559
United K'gd'm	Florida	609	$863
	New York	108,774	120,812
	Total	109,383	$121,675
Yugoslavia	Los Angeles	4	$13
	New York	1,464	1,252
	Philadelphia	8,797	10,478
	Total	10,265	$11,743
	Grand total	457,238	$507,918

Illinois Highway Users Organize

THOUSANDS of users of the highways of Illinois, especially those firms and individuals who utilize the roads in pursuit of their daily bread, are rallying to support a new statewide organization, known as the Illinois Highway Users' Conference. Recently chartered by the state, the organization is based on the general plan of the National Highway Users' Conference. Its incorporators include: M. Ready, president, Ready Coal and Construction Co.; Robert T. Hendrickson of the Hendrickson Motor Truck Co., and F. E. Ertsman, secretary of the Illinois Motor Truck Owners' Association. Mr. Ertsman is secretary of the conference and is in charge of its offices in the Lake-Michigan building, Chicago. Lafayette Markle, president of the Chicago Automobile Trade Association, has been chosen chairman of the conference. Vice-chairman and members of the advisory committee are now being named from various parts of the state.

The trades have been quick to respond to the appeal of the new organization, explained Mr. Ertsman. "Of course, all branches of the automotive industry are interested in the conference," he said. "But so are the operators and miners of coal, contractors and builders, and such industries as dairy products, grain and feed, wholesale and chain store groceries and meats, gasoline and oil, hardware, engineering firms, laundries, ice cream and ice, traffic mill and factory supplies, packing and shipping, hotels, tires and rubber, cartage, waste removers, warehousing and distributing, stone and gravel, excavating and trucking, and associated industries. We welcome the members of these trades and the farmers of Illinois, as well as other motorists, into the Illinois Highway Users' Conference, and shall be glad to send them further information if they will write to us."

Chairman Markle explained that the conference is not a motor club, but has for its purpose the study of legislation and taxation affecting the motor car owner. It is particularly concerned at this time with protesting against the further diversion of motor fuel (gas tax) funds from the Illinois state treasury. Already $16,000,000 has been borrowed from the state's share of the gas tax. This money was paid into the state wholly by owners of motor vehicles for the express purpose of building and maintaining the roads, but several bills are now before the state legislature which seek to further divert the use of the gas tax money, chiefly proposing to use it for relief purposes.

Mr. Markle stressed the economic shortsightedness of such a policy. He pointed out that 90% of such money goes for labor, either directly or indirectly through road construction and its associated industries.

"To divert this gas tax money into other channels than road building or maintenance is decidedly unjust to the owners and drivers of motor vehicles who pay the heavy gas tax for the express purpose of road building," declared Mr. Markle. "It is also unfair to the associated industries and the millions of persons who earn their living from them. There seems to be a widespread attempt in almost every state to use gas tax money for relief or various other governmental purposes, and we feel that the industries as well as individual motorists should point out to their legislators that such action means throwing thousands of men out of work, and will put these men and their families on the very 'dole' it is planned to pay from motor fuel tax funds. Is this economy? Is this the American plan? Decidedly not!"

Technical Employment Report

THE Philadelphia Technical Service Committee Employment Report of operations for the first eight months of its existence has been issued. This committee is sponsored by the Engineers' Club of Philadelphia, which is coordinating the employment service for unemployed engineers of 12 national engineering societies and the association of the State Employment Commission of Pennsylvania for the Philadelphia Metropolitan area.

The work of the committee is divided into four main divisions: Placement; field contacts; publicity; and research. Applications of 1005 men are on file with the committee and every effort is made to secure for the employer the best talent available. No charge is made for this service.

Report Improvement in North Carolina Mining District

THERE HAS BEEN some improvement in recent weeks in the Spruce Pine mining district, which includes portions of three counties, Mitchell, Yancey and Avery, according to business leaders here.

Beginning August 1 the roofing mica business began to pick up rapidly and has held up since. Four producers here are running practically at capacity. These are the Victor Mica Co., the Harris Clay Co., the English Mica Co., and the Biotite Mica Co.

Harry M. Urban, mining engineer and head of the Spruce Pine Mica Co., says that prospects are good for a decided upturn in business. He also said that the Spruce Pine Mica Co. is now running at one-third of its capacity, at both mines and plant, and that the concern is expecting to increase its capacity up to 50% by the end of the year.

Improvement has been noted recently in the kaolin business. There is a fair demand, although the outlook is said to be uncertain.

The feldspar industry is quiet, but business is reported to be slightly better. The plants are running at an average of about 35% capacity. The feldspar plants include the Tennessee Mineral Products Co., at Spruce Pine; the North State Feldspar Corp. at Micaville; the Feldspar Milling Co. at Bowditch, and the Carolina Mineral Co. of Spruce Pine, a branch of the Consolidated Corp., Trenton, N. J.

Ed Boone, superintendent of the Carolina Mineral Co., said that the plant is working at about half its capacity and expects to increase production to full capacity.

B. C. Burgess, manager of the Tennessee Mineral Products Co., said that there has been a slight improvement in the feldspar business and that his company is now operating at 25% capacity.—*Asheville* (N. C.) *Times.*

Develops New Gypsum Deposit in Texas

GYPSUM is rapidly being commercialized in Gillespie county, Texas. O. L. Neyland, engineer of San Antonio, is working deposits located about 14 mi. north of Fredericksburg. Twelve cars have been shipped to San Antonio cement companies, where it is used in the manufacture of cement.

It is planned to double the present output of about 5000 tons per year. The gypsum is mined and crushed where it is found. It is claimed that the gypsum found in this county is of a high quality and sells for a good price.

Reports are that other deposits are being investigated in this county to determine whether there is sufficient quantity of the mineral and also whether it is of good quality. I. M. Hirschfeld, mining engineer, is interested in iron and chromium deposits. The Cohen Co. of California is investigating the barium sulphate deposits.

Portland Cement Production, September

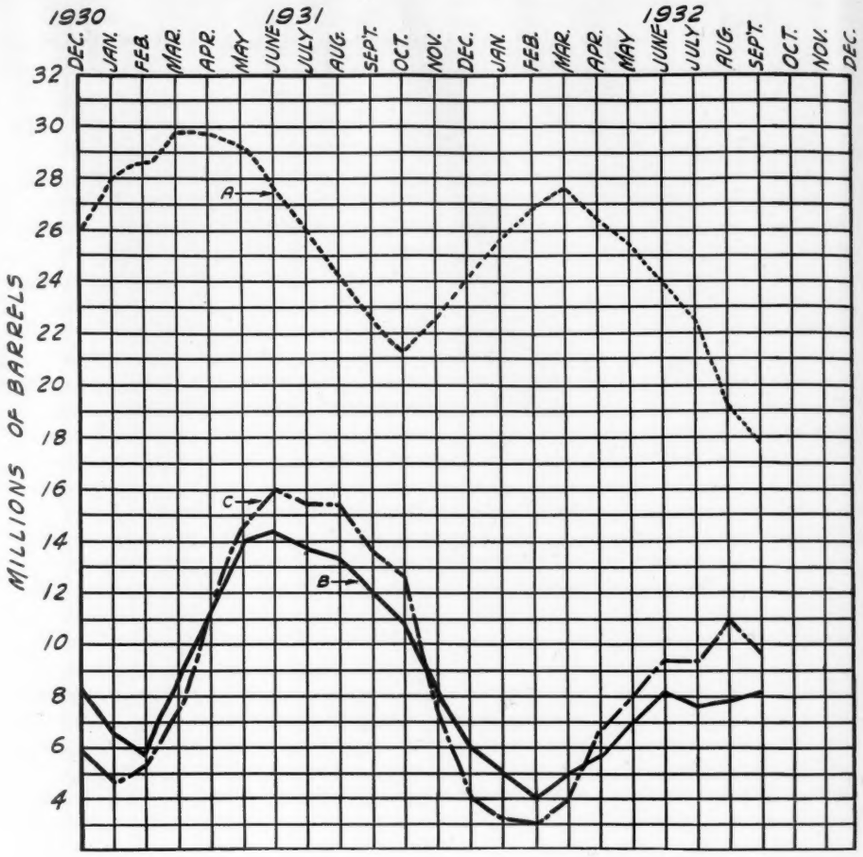
THE PORTLAND CEMENT INDUSTRY in September, 1932, produced 8,189,000 bbl., shipped 9,722,000 bbl. from the mills and had in stock at the end of the month 17,865,000 bbl. Production of portland cement in September, 1932, showed a decrease of 32.3% and shipments a decrease of 28.9% as compared with September, 1931. Portland cement stocks at mills were 21.4% lower than a year ago. The total production for the nine months ending September 30, 1932, amounts to 57,839,000 bbl. compared with 99,673,000 bbl. in the same period of 1931, and the total shipments for the nine months ending September 30, 1932, amounts to 64,212,000 bbl. compared with 102,807,000 bbl. in the same period of 1931. The statistics here given are compiled from reports for September, received by the Bureau of Mines, from all manufacturing plants except five, for which estimates have been included in lieu of actual returns. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of September, 1932, and of September, 1931.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

	September		Aug.	July	June
	1931	1932	1932	1932	1932
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	55.3	36.9	34.2	33.4	35.7
12 months ended	50.2	30.6	32.1	34.2	36.5

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during July and August, 1931 and 1932, in barrels:



(A) Stocks of finished portland cement of factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN JULY AND AUGUST, 1931 AND 1932 (IN BARRELS)*

Shipped to—	1931—July	1932	1931—August	1932
Alabama	90,757	26,937	88,251	43,836
Alaska	2,716	2,442	1,666	1,570
Arizona	41,979	13,945	37,842	10,833
Arkansas	124,724	20 423	†102.693	29,306
California	540,476	366,727	521,774	410,822
Colorado	73,107	45.274	77.569	58.010
Connecticut	166,381	80,902	159,855	100,729
Delaware	42,710	38.443	30,933	32,173
District of Columbia	126,637	87.905	122,153	109,666
Florida	106,826	37.770	68,905	49,148
Georgia	144,400	98,189	191,428	106.631
Hawaii	23,770	16.045	20,407	17,666
Idaho	22,930	8,961	23,842	10,689
Illinois	1,054,935	923.612	1,063,517	867.859
Indiana	682,234	482.652	592.825	557.005
Iowa	681,197	350,388	563.562	431,321
Kansas	198,757	88.175	242,108	91,387
Kentucky	202,923	117.036	†186,726	205.040
Louisiana	505,614	97,884	498,824	167.844
Maine	86,427	80,949	75,516	77,546
Maryland	186.573	175 526	161.645	214.006
Massachusetts	377,774	272.853	332,816	308,259
Michigan	908,045	400.128	787,425	482,658
Minnesota	681,655	597,902	668,690	646,666
Mississippi	66,519	15,598	67,290	37,896
Missouri	439,866	478.055	†483,764	471,862
Montana	32,722	15.319	34,859	19,274
Nebraska	281.405	48.233	319,336	96.855
Nevada	9,774	99,152	9,907	97,967
New Hampshire	63,680	17,092	78,995	29,829
New Jersey	519,732	282.170	550,716	342,947
New Mexico	21.853	11,869	20,056	11,438
New York	2,415.239	1,246,668	2,548.291	1,437,016
North Carolina	126,608	28,314	77,320	45,680
North Dakota	31 587	22.693	22.552	16,872
Ohio	869,396	539,371	700,988	774,702
Oklahoma	226,890	65,442	311,923	135,342
Oregon	102,903	56,746	93,759	63.606
Pennsylvania	807 513	451,127	869.155	604,752
Porto Rico	5,595	2,337	4,035	820
Rhode Island	57.157	33.395	59.707	31,578
South Carolina	151,919	24,879	141,224	22,402
South Dakota	101.420	27,280	95,711	32,468
Tennessee	110.542	90,884	†119,876	89,977
Texas	588.163	331,951	562,895	392,333
Utah	42,650	10,745	24,194	25,011
Vermont	48,958	55,515	56,224	56,063
Virginia	178,952	72,801	146.156	115,664
Washington	265,116	119,136	223.760	168,362
West Virginia	179,975	89,286	166,437	93,479
Wisconsin	611.166	483,432	712,588	630,006
Wyoming	20,863	7,177	15,674	8,387
Unspecified	61,210	†44,079	†11,303	61,025
	15,512,920	†9,201,814	†15,149,757	10,944,313
Foreign countries	32,080	16,186	†22,243	23,687
Total shipped from cement plants	15,545,000	†9,218,000	15,172,000	10,968,000

*Includes estimated distribution of shipments from three plants each month.
†Revised.

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1931 AND 1932, (IN BARRELS)

Month	1931—Production	1932	Stocks at end of month 1931	1932
January	8,129,000	6,107,000	10,384,000	8,184,000
February	7,473,000	5,176.000	11,946,000	9.375.000
March	9,586,000	5,443,000	13,318.000	10,025.000
April	11,540,000	5.924.000	13,854,000	10,511.000
May	13,159,000	6,273 000	13,087,000	9,922,000
June	12,679,000	6,803,000	11,837,000	8,877,000
July	12 246.000	6,613,000	10,209,000	7,889,000
August	11.664 000	7.078.000	8,468.000	*7.175,000
September	10,414,000	7,709,000	6,918,000	6,742,000
October	9,825.000	.....	6.021.000	.....
November	8,259,000	.....	6,215,000	.....
December	6,840,000	.....	7,035,000	.....

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN SEPTEMBER, 1931 AND 1932, AND STOCKS IN AUGUST, 1932 (IN BARRELS)

District	Production 1931—Sept.—1932		Shipments 1931—Sept.—1932		Stocks at end of month 1931	1932	Stocks at end of Aug., 1932*
Eastern, Penn., N. J. & Md.	2,761,000	1,606,000	3,108,000	1,683,000	5,422,000	3,903,000	3,979,000
New York and Maine	1,292,000	628,000	1,500,000	726,000	1,281,000	1,496,000	1,594,000
Ohio, West'n Penn., W. Va.	1,063,000	792,000	1,224,000	978,000	3,344,000	2,127,000	2,313,000
Michigan	743,000	524,000	807,000	849,000	1,908,000	1,273,000	1,598 000
Va., Tenn., Ala., Ga., Fla., La.	1,069,000	394,000	1,032,000	457,000	1,725,000	1,370,000	1,434,000
Wis., Ill., Ind. and Ky.	1,623,000	1,255,000	1,995,000	1,706,000	2,648,000	1,492,000	1,942,000
East'n Mo., Ia., Minn., S.D.	1,228,000	1,039,000	1,341,000	1,524,000	2,361,000	1,892,000	2,377,000
West'n Mo., Nebraska, Kansas, Oklahoma and Arkansas	701,000	698,000	886,000	698,000	1,305,000	1,531,000	1,531,000
Texas	625,000	427 000	688.000	315,000	539,000	717,000	605,000
Colo., Mont., Utah, Wyo., Ida.	171,000	216,000	224,000	188,000	541,000	509,000	482.000
California	529,000	499,000	593.000	433,000	1,050,000	1,079,000	1,014,000
Oregon and Washington	287,000	111,000	273,000	165,000	612,000	476,000	529,000
	12,092,000	8,189,000	13,671,000	9,722,000	22,736,000	17,865,000	19,398,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1931 AND 1932 (IN BARRELS)

Month	1931—Production—1932		1931—Shipments—1932		Stocks at end of month 1931	1932
January	6,595,000	5,026,000	4,692,000	3,393,000	27,759,000	25.778,000
February	5,920,000	3,971,000	5,074,000	3,118,000	28.612,000	26,657,000
March	8,245,000	4,847,000	7,192,000	3,973.000	29,676,000	27,545,000
April	11,245 000	5,478,000	11,184,000	6,536,000	29,715,000	26,496,000
May	14,010,000	6,913,000	14,200.000	8,020,000	29,554,000	25,394,000
June	14,118,000	7,921,000	16,077.000	9,264,000	27,602,000	*24,043,000
July	13,899,000	7,659,000	15,545,000	*9,218,000	25,934,000	22,512,000
August	13,549,000	7,835,000	15,172.000	10,968,000	24.313,000	*19,398,000
September	12,092,000	8,189,000	13,671,000	9,722,000	22,736,000	17,865,000
October	10,762,000	.....	12,360,000	.....	21,218,000	.....
November	8,161,000	.....	7,156,000	.....	22,219,000	.....
December	5,974,000	.....	4,142,000	.....	24,098,000	.....
	124,570,000	.....	126,465,000	.....	.....	.....

*Revised.

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN SEPTEMBER, 1931 AND 1932 (IN BARRELS)

District	1931—Production—1932		Stocks at end of month 1931	1932
Eastern Pennsylvania, New Jersey and Maryland	2,417,000	1,420.000	936,000	811.000
New York and Maine	987,000	608.000	315.000	440,000
Ohio, Western Pennsylvania and West Virginia	822,000	735,000	868,000	638,000
Michigan	464,000	434,000	555,000	935,000
Wisconsin, Illinois, Indiana and Kentucky	1,276,000	1,116.000	532,000	354,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,078,000	445.000	720,000	479,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,168,000	949,000	545,000	395,000
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	691,000	630,000	456.000	435,000
Texas	576,000	426,000	274,000	241,000
Colorado, Montana, Utah, Wyoming and Idaho	109,000	255,000	187,000	333,000
California	502,000	560,000	1,230.000	1,359,000
Oregon and Washington	324,000	131,000	300,000	322,000
	10,414,000	7,709,000	6,918,000	6,742,000

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1931 AND 1932

Month	1931—Exports		1932—Exports		1931—Imports*		1932—Imports*	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	41,199	$115,678	36.704	$82.984	95,609	$120,298	14,375	$16,648
February	25.703	88.989	12.889	39,350	21,984	25,391	83,706	69,197
March	54,599	144.579	39.105	81,856	70,378	80,360	19,173	17,215
April	40.478	116,564	30,123	69,451	53,333	58,576	59,392	41,487
May	48,028	140.953	31.634	71.048	19,325	20.568	9.223	7,358
June	43,597	107,610	33.134	72,084	32,079	42,955	20,963	15.496
July	29,344	97,837	18,872	54,814	14,332	15,582	31,518	24,904
August	39,517	106,643	25,110	48,961	8,895	11,739	78,600	60,474
September	27,570	81,399	.....	.....	33.574	33,520	.....	.....
October	24,531	68,524	.....	.....	39,642	42,380	.....	.....
November	33,200	97,796	.....	.....	27,940	22,235	.....	.....
December	21,887	54,028	.....	.....	40,147	34,314	.....	.....
	429,653	$1,220,600	.....	.....	457,238	$507,918	.....	.....

*Includes hydraulic cement clinker and white nonstaining portland cement.

Exports and Imports†*

Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN AUGUST, 1932

Exported to	Barrels	Value
Canada	756	$2,464
Central America	14,805	20,015
Cuba	133	649
Other West Indies and Bermuda	963	1,861
Mexico	1,826	5,459
South America	5,839	15,118
Other countries	788	3,395
	25,110	$48,961

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS IN AUGUST, 1932

Imported from	District into which imported	Barrels	Value
Belgium	Massachusetts	18,513	$16,385
Canada	Porto Rico	1,744	$1,131
Denmark	New York	52,564	$36,349
France†	New York‡	1,557	$2,724
Japan	Maine and N. H.	41	$135
United K'gd'm.	Hawaii	3,575	$1,797
	New York‡	606	1,953
	Total	4,181	$3,750
	Grand total§	78,600	$60,474

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO IN AUGUST, 1932

	Barrels	Value
Alaska	3,134	$6,915
Hawaii	16,881	38,092
Porto Rico	495	759
	20,510	$45,766

*The value of exports of domestic cement is the actual cost at the time of exportation in the ports of the United States whence they are exported, as declared by the shippers on the export declarations.

†The value of imported cement represents the foreign market value at the time of exportation to the United States.

‡White nonstaining portland cement.

§Includes 2193 bbl. white nonstaining portland cement, valued at $4,764.

Federal Specification for Keene's Cement

A PROPOSED Federal specification has been prepared and submitted to the industry by the Federal Specifications Board. Comments or suggestions as to changes thought to be desirable will be received and considered by the technical committee until November 23.

The specification applies to anhydrous calcined gypsum, the set of which is regulated by the addition of other materials, when used for plastering. When used for such purposes Keene's cement shall be furnished in the following types: (1) for base and finish coat plastering; and (2) for finish coat plastering.

It is specified that Keene's cement shall have a combined water content of not more than 2%, a tensile strength of not less than 400 lb. per sq. in., that not less than 98% shall pass a standard No. 40 sieve and not less than 75% shall pass a No. 200 sieve. Type 1 shall set in not less than one hour nor more than four, and type 2 shall set in not less than 20 min. or more than 4 hours.

The specification outlines the methods of sampling, inspection and tests and method of packaging, packing and marking.

It is believed that this specification makes it unnecessary to obtain samples of Keene's cement prior to award of contracts.

Quarry Gets Contract for 1933 Cement Plant Requirements

THE Winterset Limestone Co., Winterset, Ia., has received a contract from the Pennsylvania-Dixie Cement Corp. to furnish its season's requirements of limestone screenings, rough quarried limestone and rough quarried shale for the year 1933, totaling approximately 150,000 tons of material.

Shipping will commence around April 1, 1933, and continue at the rate of 1000 to 1500 tons per day.

Glenn Poarch, manager of the company, stated that the contract will likely mean work at the quarry most of the winter. The Winterset Limestone Co. has been operating 18 months.

Work on Heavy Jobs Shared to Keep Men Physically Fit

STEPS to prevent physical deterioration of men as well as plants and equipment are being taken by northeastern Ohio steel companies. On some jobs steel workers, like trained athletes, must remain finely-conditioned physically.

Because several weeks' idleness weakens men doing heavy work in some departments, the mills, particularly in sheet plants, are operated "level-handed." Two or more crews work a turn, dividing the work and dividing the wages. Hence the layoff period is shortened, workmen still receive their share of work available and remain physically fit.—*Wall Street Journal* (New York).

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Water Control of Dry Mixed Concrete

By G. W. Gleeson*

IT IS but very recently that products manufacturers, using "dry mixed" concrete, have come to the full realization that the water-cement ratio is inapplicable in their case. The realization has, however, failed to impress quantitatively the effect of variable water content upon product quality, and although machine operations limit water variation in both directions, there remains sufficient latitude to enhance or destroy quality. It is the purpose of what follows to briefly call attention to the possibilities that exist through water control or lack of it in the products field. The data included are not applicable without the full knowledge of the fact that other variables were held constant throughout all experiments, but they are presented as indicators of that which might be expected from repetition of experiment or experience.

The literature appears void of suggestions as to water content for "dry mixes" except for such relationships as illustrated in Fig. 1. This curve has been published in many articles and texts and it is considered that the products field lies on the dry side of maximum strength, a contention that is supported by subsequent data. The exact location remains a matter of conjecture, but it is interesting to anticipate that if products lie close to maximum strength where the curve has a very steep slope, a slight variation in water content should cause a marked change in strength. It is recognized that the field of product fabrication of non-plastic concrete is somewhere between a porous, granular condition of product due to too little water and a condition of slump due to too much. However, to control the water to some indefinite, intermediate value does not give full satisfaction, and it is to impress the critical influence of water content upon quality that prompts that which follows.

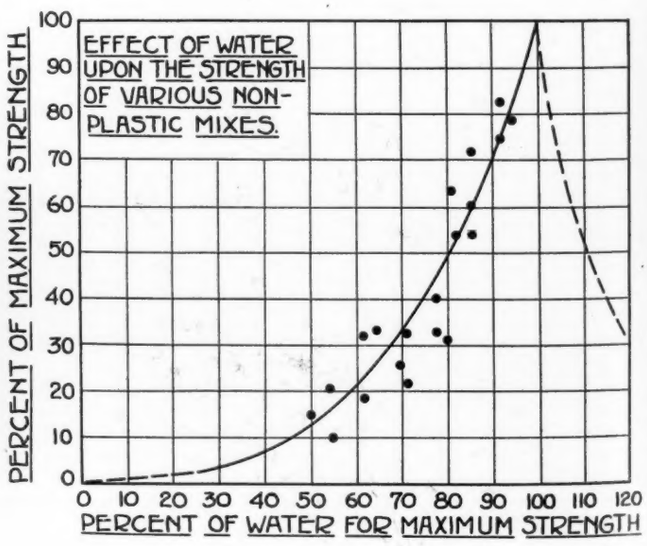
Editor's Note

A DISTINCTION which every reader of this article must make, in applying the data to his own problem, is pointed out in the opening paragraph. That is, that the article applies to "dry-mixed" concrete, or concrete having no slump. Standard building units, cast stone, some concrete pipe, silo staves, etc., are examples of "dry-mixed" concrete. Manufacturers of concrete burial vaults and products having measurable slump must be governed by the water-cement ratio in considerations involving their mixes.

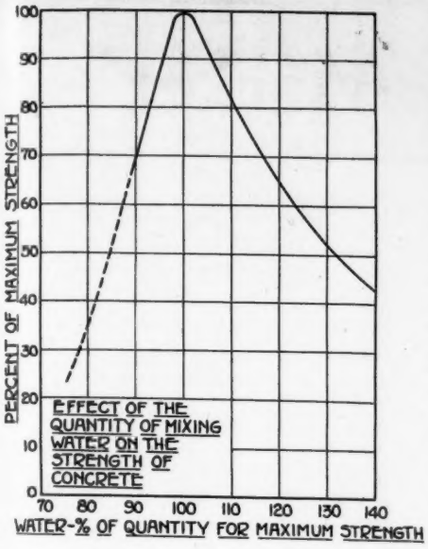
Experiments were conducted with compression specimens, tension specimens and 10-in. diameter pipe, all being made from dry mixed concrete of uniform content of ingredients except the water. In all cases care was taken to duplicate the method of placing and compaction. Accurate control of proportions and aggregate was exercised throughout. In short, an attempt was made to eliminate all variables that might influence strength except the water. Fig. 2 shows a group of the test specimens shortly before breaking.

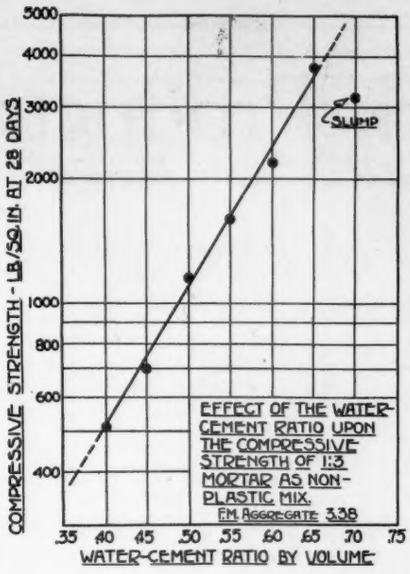
The data are presented entirely in a graphical manner in Figs. 3, 4 and 5, Fig. 3 being the results of tests upon compression cylinders, Fig. 4 tension specimens, and Fig. 5, 10-in. pipe that were prepared without bells. The data are plotted to semi-logarithmic scale because of the very close approximation of the variation to a straight line on such a plot. The range of variation of water content was greater than that feasible in machine compacted products for the same

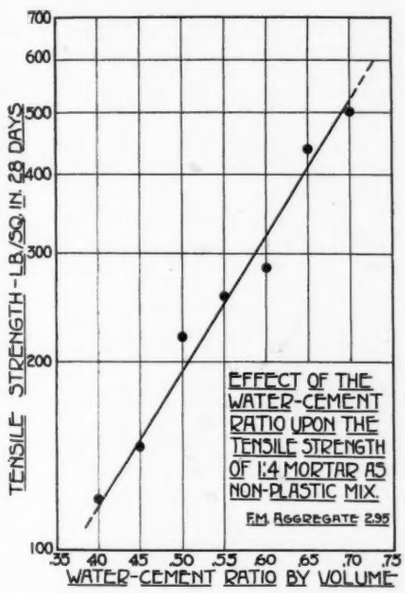
*Testing Engineer, Tuerck-MacKenzie Co. Instructor, Mechanics and Materials, Oregon State College.

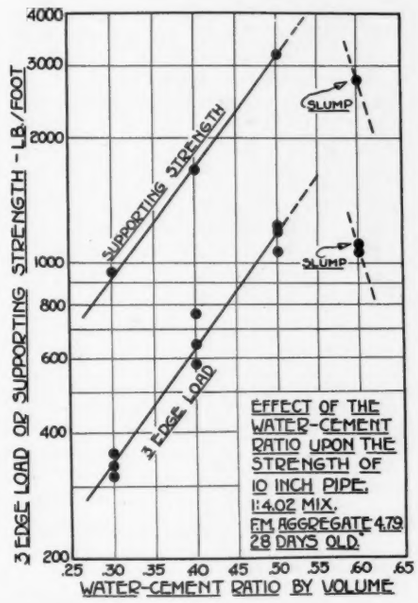


At left, Fig. 2; at right, Fig. 6


PERCENT OF MAXIMUM STRENGTH
EFFECT OF THE QUANTITY OF MIXING WATER ON THE STRENGTH OF CONCRETE
WATER-% OF QUANTITY FOR MAXIMUM STRENGTH


COMPRESSIVE STRENGTH - LB./SQ.IN. AT 28 DAYS
SLUMP
EFFECT OF THE WATER-CEMENT RATIO UPON THE COMPRESSIVE STRENGTH OF 1:3 MORTAR AS NON-PLASTIC MIX.
F.M. AGGREGATE 3.38
WATER-CEMENT RATIO BY VOLUME


TENSILE STRENGTH - LB./SQ. IN. 28 DAYS
EFFECT OF THE WATER-CEMENT RATIO UPON THE TENSILE STRENGTH OF 1:4 MORTAR AS NON-PLASTIC MIX.
F.M. AGGREGATE 2.95
WATER-CEMENT RATIO BY VOLUME


3 EDGE LOAD OR SUPPORTING STRENGTH - LB./FOOT
SUPPORTING STRENGTH
SLUMP
SLUMP
3 EDGE LOAD
EFFECT OF THE WATER-CEMENT RATIO UPON THE STRENGTH OF 10 INCH PIPE. 1:4.02 MIX. F.M. AGGREGATE 4.79 28 DAYS OLD.
WATER-CEMENT RATIO BY VOLUME

Upper left, Fig. 1; upper right, Fig. 3; lower left, Fig. 4; and lower right, Fig. 5

type aggregate, and although the tests were not extensive they were considered sufficient to act as indicators only and thereby fulfill their purpose.

In all cases a regular increase in strength with increase in water content is to be noted. This is not equivalent to saying that the water as a hydrating medium of the cement is responsible for the increase, because such is very seriously doubted. It is rather considered that the increase in strength is the result of greater compaction made possible by the water. It is probably poor form to speak of workability in connection with the non-plastic "dry mixes," but certainly a very limited workability exists even though it is not measurable in a quantitative manner, and it is quite possible that a slight change in this limited workability by the incorporation of more water in the mix is responsible for the quality variations as expressed by the strength. Since the manner of compaction was maintained uniform, a greater effect was produced by the same effort in the case of the greater water contents, the same producing the stronger concrete.

As indicated by the water-cement ratio values (expressed by volume), the water content was varied from an extremely dry to practically plastic condition. The more plastic concrete resulted in a very evident slump for the higher water-cement ratios in the case of the cylinders and pipe. This slump upon removal of the molds resulted in decreased strength, as is evident from the plots, and it is considered that these specimens were evidently over the peak represented in Fig. 1.

Fig. 6 is a compilation of all experimental points to the same scale as Fig. 1, the maximum strengths being approximated by the intersection of lines through the slump points and through the general points. Obviously, such extrapolation gives rather widely scattered results, but the trend of the curve in Fig. 6 is very definite and is in complete harmony with the prediction of Fig. 1.

The foregoing to some extent enables a visualization of the importance of the water content and is presented simply to indicate that any one manufacturer can, for his particular conditions of operation, arrive at results through controlled experimental tests that are valuable under those same conditions. The above curves also illustrate the general trend of more water, greater strength, and indicate that the water is very critical as regards quality from a strength standpoint. The addition of as little water as three pints per sack of cement shows an indicated increase in the supporting strength of pipe of as high as 23%. An amount of water as small as three pints to a sack is rather difficult of observation in a dry mixed batch of concrete where appearance only indicates the quantity. Where web markings are used as indications of sufficient water, where a variable aggregate is common, or where a variable water content in the aggregate is experienced, it is evident that a large variation in strength might result. Consequently, there is a need for an indicator of water content in the dry mixed field, the same not being available at the present time.

The only safe and sure rule for water control may be stated briefly: it is much better to operate approximating a too wet condition than a too dry one, and products of far better quality will result where an occasional slump of the product is experienced. True, the above is recognized, but if observation is indicative, a great deal of trouble has its root in the fact that such a condition is not rigidly adhered to. It seems impossible that any set of numerical figures will ever apply to all cases of product manufacture as far as the water content is concerned, but until more knowledge is available it is necessary to accept pointers that convey the message of including the maximum amount of water compatible with operating conditions.

Investigate Charge of Unfair Competition in Asbestos

THE TARIFF COMMISSION is now investigating the charge of American asbestos producers that Russian competition is unfair. Testimony has been introduced claiming that convict labor is engaged in the production of Russian asbestos, that the Soviet government can undersell American producers, and that the Soviet government is behind the Russian asbestos trust. This is the first case instituted by the commission under Section 337 of the Tariff Act of 1930. It is expected that the hearing will end early in October.

The Rock Products Market

Wholesale Prices of Aggregates

(F.O.B. Plant or City Designated)

Prices given are for crushed limestone per ton, unless otherwise stated

	Crushed stone: Screenings, ¼ in. down	Crushed stone: ½ in. and less to 2½ in	Sand ¼ in. and less	Gravel, ½ in. and less to 2 in.	Slag: Screenings, ¼ in. down	Slag: Crushed, ½ in. and less to 3 in. and larger
EASTERN:						
Albany, N. Y. (u)			.90*	1.35*		
Alexander, N. Y.			.65d	.65d		
Bethlehem, Penn.					.40– .50	.50– .90
Boston, Mass. (g)			1.05	1.60		
Buffalo, N. Y.	1.25¶	1.25¶			1.50d	1.50–1.60d
Clarence, N. Y.			.60v	.60v		
Donora, Penn.					1.00	1.25
Hillsville, Penn.	.70– .85	1.00–1.35				
Montoursville, Penn.			.50– .75	.40		
New York City			1.00*	1.50*		
Philadelphia, Penn. (trap rock)	2.16–3.51	2.36	1.35	1.50		
Port Jefferson, N. Y.			.40*	1.10*		
Utica, N. Y.	.50	.75–1.00	.50– .75	.75–1.00		
Washington, D. C.			.85	1.30		
CENTRAL:						
Alton, Ill.	1.25					
Chicago, Ill.	.60	.75	1.00	1.10	.40– .60	.85–1.05
Cleveland, Ohio					1.15	1.15
Davenport, Iowa	1.00	1.25				
Eau Claire, Wis.			.30– .40	.65– .80		
Greenbush, Mich.			.40x	.70y		
Grand Rapids, Mich.			.30	.60		
Hannibal, Mo.	1.00	1.00				
Indianpolis, Ind.			.25– .50	.50– .70		
Merom, Ind.			.30– .50	.50– .70		
Milwaukee, Wis. (w)	1.14	1.24	.59	.69		
Stone City, Iowa	.75	1.00				
St. Louis and Maplewood, Mo.	1.25	1.25				
Toledo, Ohio	1.16	1.66			1.10	1.20
Waukesha, Wis.	.90	.90	.35	.45		
Youngstown, Ohio, district					1.00	1.10–1.20
SOUTHERN:						
Anniston, Ala.¶					‡.50	‡.90–1.25p
Birmingham and Ensley, Ala.					.55	.80–1.25
Cartersville, Ga.	.75	.90		.90		.75
Chico, Tex.	.50u	1.00u				
(Trap rock)	2.25u	1.00u				
Columbia, S. C. (granite)	.50	1.40				
Ft. Spring, W. Va.	.35	.90–1.15q				
Ft. Worth, Tex.			1.40	1.65		
Houston, Tex.			1.25*	1.86		
Knoxville, Tenn.	.75	.75	.60– .80	.65– .90		
Lithonia, Ga. (granite)	.25– .35	.75				
Longdale, Va.					.75	1.00–1.25
Montgomery, Ala.			.30– .40	.50– .60		
Olive Hill, Ky.	.50–1.00	.90				
San Antonio, Tex.	1.10r	1.20r				
Woodward, Ala.					.55‡	.90–1.25‡
WESTERN:						
Denver, Colo.¶			1.15*	1.75*		
Ft. Gibson, Okla.				.80s		
Long Beach, Calif.	1.60	1.40	.80			
Los Angeles, Calif.			.20d	.55d		
Salt Lake City, Utah			.60‡	.60‡		
San Francisco, Calif.			1.40	1.40		
Seattle, Wash.			.75*	.75*		
Tulsa, Okla.	.50– .72h	.95a	.25			

*Prices per cu. yd. ¶F.o.b. cars. ‡Prices less 5c disc. per ton for payment 15th following month. (a) ½-in. to ¾-in.; also 1.27 for ½-in. and less to 2½-in. stone, disc. 15c cash, 10 days. (b) ½-in. to 1½-in. (c) 1½-in. and less. (d) F.o.b. trucks at plant. (e) Delivered in truck loads. (f) ¾-in. to 2½-in. (g) Delivered to job by truck, Boston. (h) Disc. 15c ton, cash 10 days. (k) Less 10c cash disc. (m) 2-in. and less. (n) Per cu. yd. in city limits. (p) ⅝-in. to 2½-in. (q) ½-in., 1.15; 2½-in., 90c. (r) Per ton f.o.b. cars San Antonio, inclusive of freight from New Braunfels, Tex. (s) ¼-in. to 1½-in. washed gravel, 80c per ton. (u) F.o.b. plant. (v) F.o.b. cars or trucks. (w) Sand and gravel also at 1.00–1.35 per cu. yd. (x) Concrete sand. (y) Washed pebble, 70c; road gravel, 1½-in., per ton, 50c; ¾-in., 35c.

Mica

Prices given net, f.o.b. plant or shipping point.

Martinsville, Va.—Mine scrap, per ton	10.00
Clean scrap, crushed and screened, per ton	12.00
Penland, N. C.—Mine scrap, per ton, 12.00; punch, 5c; clean shop scrap, per ton, 14.00; roofing mica, per ton	16.00
Franklin, N. C.—Ground mica, 20 mesh, 21.00; 40 mesh, 22.00; 60 mesh, 35.00; 100 mesh	42.00

Roofing Slag

Prices given are per ton f.o.b. city named.

Bethlehem, Penn.	1.00–1.50
Buffalo, N. Y.	2.50†
Chicago, Ill.	.90–1.25
Donora, Penn.	2.35
Ensley and Birmingham, Ala.	2.05
Longdale and Goshen, Va.	2.50
Toledo, Ohio	1.20¶
Woodward, Ala.	2.05*
Youngstown, Ohio, district	2.00

*Less 5c ton disc. for pay. 15th following month. †Price f.o.b. trucks at plant, subject to discount of 10c per ton for payment on or before the 15th of following month. ¶F.o.b. trucks, slag plant.

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.05% $MgCO_3$; 90% thru 100 mesh	4.50
Cartersville, Ga.—50% thru 100 mesh, per ton, 1.50; finely pulverized, per ton	2.00
Chicago, Ill.—50% thru 50 mesh, per ton	.80
Chico, Tex.—90% thru 100 mesh, per cwt., 1.00; per ton	9.00
Colton, Calif.—Analysis, 95.97% $CaCO_3$; 1.31% $MgCO_3$ all thru 14 mesh down to powder	3.50
Davenport, Iowa — Analysis, 90-98% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 4 mesh; bulk	1.00
Dolomite, Calif.—Analysis, 54.20% $CaCO_3$; 45.20% $MgCO_3$; 0.6% SiO_2, Al_2O_3, Fe_2O_3; 100% thru 4 mesh, per ton, 1.70; 99% thru 10 mesh, per ton	2.10
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh, per ton, bulk, 1.25; in 80-lb. bags	2.75
Gibsonburg, Ohio—99% thru 10 mesh, 60% thru 100 mesh; in bags, per ton, 3.50; in bulk, per ton	2.50
Agricultural meal, 100% thru ⅜-in. mesh screen, 25% thru 100 mesh screen, ton	1.00
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh, sacked, per ton, 5.00; also pulverized limestone, per ton	3.25
Knoxville, Tenn.—80% thru 100 mesh, bulk, 2.00; in bags, per ton	3.25
Lannon, Wis.—50% thru 100 mesh	1.50
Olive Hill, Ky.—90% thru 4 mesh	1.00
Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh, and 45% thru 200 mesh, per ton	3.25
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, per ton, 4.05; 50% thru 100 mesh	2.10
West Rutland, Vt.—Analysis, 96.5% $CaCO_3$; 1.5% $MgCO_3$, 70% thru 100 mesh, 100% thru 40 mesh, in bulk, 2.50; in bags, per ton	3.75

Chicken Grits

Chicago, Ill.—Chicken grit or bird gravel	1.00
Chico, Tex.—(Limestone) packed in 100-lb. sacks, per cwt., f.o.b. plant	1.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
Dolomite, Calif.—(Limestone), special sizes in 50-ton cars, yellow, per ton	9.00
White, per ton	6.00
Gibsonburg, Ohio.—(Agstone)	5.00– 5.25
Hannibal, Mo.—(Limestone), per ton	10.00
Los Angeles, Calif.—Marble grits, per ton, incl. sacks	7.50–12.50
Maplewood, Mo.—(Limestone), per ton	10.00
Middlebury, Vt.—Per ton (a)	10.00
New York City—Per cu. yd.	1.00
Port Clinton, Ohio—(Gypsum), per ton	6.00
Tuckahoe, N. Y. (aggregate) per ton	5.00
Utica, N. Y.—(Limestone), per ton	3.25
Warren, N. H.—(Aggregate)	7.80–11.00
Waukesha, Wis.—Limestone, per ton, 7.00; agstone, per ton	6.00

(a) F.o.b. Middlebury, Vt.

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis, 90-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Waukesha, Wis.—90% thru 100 mesh	4.05

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.84½	3.38	.....
Boston, Mass.	.49¼	1.97†	2.87¶
Cedar Rapids, Ia.	.53½	2.14	.....
Cheyenne, Wyo.	.52¼	.....	.....
Chicago, Ill.	.....	1.50†	2.40¶
Cincinnati, Ohio	.....	1.42†	2.32¶
Cleveland, Ohio	.....	.....	1.93¶
Columbus, Ohio	.....	1.41†	2.31¶
Dallas, Tex.	.....	1.85	.....
Davenport, Ia.	.50¾	2.03	.....
Dayton, Ohio	.....	1.27†	2.17¶
Denver, Colo.	.55	.....	.....
Detroit, Mich.	.....	1.47†	2.47¶
Houston, Tex.	.....	1.95	.....
Indianapolis, Ind.	.....	1.50†	2.40¶
Jacksonville, Fla.	.....	2.30†	.....
Kansas City, Mo.	.38½	1.54	2.44¶
Los Angeles, Calif.	.57½	2.30	.....
Louisville, Ky.	.....	1.44†	2.34¶
Memphis, Tenn.	.....	1.77†	2.82¶
Milwaukee, Wis.	.....	1.67†	2.57¶
Minneapolis, Minn.	.55¼	2.21	.....
Montreal, Que.	.....	1.70§	.....
New Orleans, La.	.....	1.91†	2.96¶
New York, N. Y.	.37¼	1.49†	2.39¶
Okla. City, Okla.	.50	2.00	2.90¶
Omaha, Neb.	.47½	1.90	2.80¶
Portland, Ore.	.....	2.55	.....
Reno, Nev.	.....	2.80‡	.....
St. Louis, Mo.	.....	1.54†	2.44¶
St. Paul, Minn.	.55¼	2.21	.....
San Francisco, Calif.	.....	2.05‡	.....
Seattle, Wash.	.....	2.30–2.55	2.80c
Tampa, Fla.	.....	†2.05	.....
Toledo, Ohio	.....	1.10†	2.00¶
Topeka, Kan.	.53¾	2.15	2.65¶
Tulsa, Okla.	.55½	2.22	.....
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Bonner Spgs., Kan.	.....	1.35	2.25¶
Buffington, Ind.	.....	1.25†	.....
Dallas, Tex.	.....	1.75	.....
Duluth, Minn.	.....	1.45†	.....
Hannibal, Mo.	.....	1.25†	.....
Houston, Tex.	.....	1.85	.....
Hudson, N. Y.	.....	1.50†	2.33¶
Humboldt, Kan.	.....	1.25	.....
Independence, Kan.	.....	1.35†	.....
Leeds, Ala.	.....	1.60†	.....
Lime & Oswego, Ore.	.....	2.40	.....
Limedale, Ind.	.....	1.65‖	2.15¶
Northampton, Penn.	.....	1.40†	.....
Universal, Penn.	.....	1.21†	.....
Waco, Tex.	.....	1.75†	.....

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. †Subject to 10c cash discount. ‡Subject to dealers' commission of 10c per bbl. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. (c) Quick-hardening "Velo," packed in paper bags, 10c discount 10 days. §Sales tax included at 6%. ‖Gross, in cloth.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink (a)	¶12.50–‖14.50	¶12.50–‖14.50
Cardiff, Md.—Crushed green marble (a)	¶12.50–‖14.50	¶12.50–‖14.50
Dolomite, Calif. (Lone Pine)—(a)		
White	¶8.00	¶8.00
Snowflake	.....	¶8.00
Golden, browns, grey, blues, blacks	¶13.00–‖15.50	¶13.00–‖15.50
Middlebury, Vt.—White	¶9.00–‖10.00a	.....
Randville, Mich.—Crystalite, crushed white marble, bulk	4.50	4.50– 5.00
Los Angeles, Calif. (a)		
White	¶10.00–‖12.50	¶10.00–‖12.50
Snowflake	.....	¶10.00–‖12.50
Golden, browns, grey, blues, blacks	¶13.00–‖15.50	¶13.00–‖15.50
Tuckahoe, N. Y., per ton	5.00	.....
Warren, N. H., per ton	.....	3.00– 5.00

¶C.L. ‖L.C.L. (a) Including bags.

Art and Cast Stone Aggregates

Cardiff, Md.—Green marble fines in carloads; bulk, 7.50; in bags..... 10.00

Los Angeles, Calif.—Dolomite aggregates, all sizes and colors†..... ¶10.00 ‖12.50

Dolomite special cast stone, wet-cast aggregates, white, ¼-in. to dust a5.10¶

† 100-lb. sacks. ¶C.L. ‖L.C.L. (a) In open cars.

Masonry Cement

Packed in paper sacks. Prices, f.o.b. cities named, include cost of sacks.

	Per bag	Per bbl.
Cincinnati, Ohio	.41½	1.66–1.76†
Cleveland, Ohio	.....	1.72†
Columbus, Ohio	.43	†1.62–1.72
Dayton, Ohio	.42¼	†1.52–1.69
Detroit, Mich.	.....	1.72†
Indianapolis, Ind.	.40½	1.62†
Louisville, Ky.	.38½	1.54†
Memphis, Tenn.	.46¾	1.87
St. Louis, Mo.	.43¾	1.75
Toledo, Ohio	.44¼	†1.67–1.77

†In carload lots only, subject to cash discount of 10c bbl. for payment within 15 days of invoice date.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Potash Feldspar

Bedford Hills, N. Y.—Color, white; analysis, K_2O, 10.50%; Na_2O, 2.75%; SiO_2, 68%; Fe_2O_3, 0.08%; Al_2O_3, 18%; pulverized, 100% thru 20 mesh; bulk, 10.50; in bags..... 11.70

Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.30%; Na_2O, 2%; SiO_2, 67%; Fe_2O_3, 0.10%; Al_2O_3, 18%; per ton, in bulk..... 15.00

West Paris, Me. — (Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.20%; Na_2O, 3.20%; SiO_2.65.70%; Fe_2O_3, 0.09%; Al_2O_3, 19.20%; per ton, in bulk..... 19.00

Soda Feldspar

Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis. K_2O, 5.50%; Na_2O, 5.50%; SiO_2, 68.80%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk..... 18.00

Granular Feldspar

Spruce Pine, N. C.—Chemically controlled.) Color, white; 20 mesh (granular); analysis, K_2O, 7.20%; Na_2O, 3.70%; SiO_2 70%; Fe_2O_3, 0.05%; Al_2O_3, 17.70%; per ton in bulk..... 10.50

Whiting

St. Louis, Mo., per ton..... 15.00*

Chicago, Ill., prices per ton.

Domestic putty whiting..... 10.00–12.00

Domestic precipitated whiting..... 15.00–20.00

Imported bolted whiting..... 30.00–35.00

*Packed in bbl., f.o.b. St. Louis.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Eau Claire, Wis.	.....	.60
Ohlton, Ohio	1.40	1.40
San Francisco, Calif.	3.50–5.00	3.50

Glass Sand

(Silica sand is quoted washed, dried and screened)

Ohlton, Ohio (Dried, per ton)..... 2.35

San Francisco, Calif..... 4.00–6.00

South Vineland, N. J..... 1.50

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; lowest net prices per ton f.o.b. plant

City or shipping point	Molding: Fine	Molding: Coarse	Molding: Brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	1.65	1.60	1.65	.....	.....	3.25	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.00e	.....
Elco, Ill.	Amor. silica, 90-99½% thru 325 mesh,						$10.00
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Montoursville, Penn.	.....	.....	.....	1.25a	.....	.....	.....
New Lexington, Ohio	2.00	1.25	.....	.....	.....	.....	.....
Ohlton, Ohio	1.40	1.40	.....	1.40	1.40	1.40	.....
San Francisco, Calif. (f)	3.50	5.00	3.50	2.50c	5.00	3.00d	1.75e

South Vineland, N. J.—Dry white silica. 2.00 per ton.

(a) To 1.50. (c) To 4.50 per ton. (d) To 5.00. (e) To 2.50. (f) Ground sand, 120-200-325 mesh, per ton, 16.50.

Lime Products

(Lowest carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Bulk	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	12.00	11.00	10.50	13.00	.....	17.50	.....	21.00
Buffalo, N. Y.	5.50	4.75	4.75	10.00	5.00	7.00	5.00	14.00
Cedar Hollow, Devault, Rambo and Swedeland, Penn.	.....	6.50c	6.50c	6.50c	6.00e	6.50f	7.00f	.....
Lime Ridge, Penn.	.....	.....	7.75	.....	6.00	7.00	4.50	.....
CENTRAL:								
Cold Springs, Ohio	.....	4.75	4.75	.....	.....	.....	5.00	.....
White Rock, Gibsonburg, Marblehead, Tiffin, Ohio, and Huntington, Ind.	5.50	4.75	4.75	10.00	5.00	7.00	5.00	14.00
Delaware, Ohio	5.50	4.75	4.75	7.50	.....	.....	5.00	.....
Woodville, Ohio	5.50	4.75	4.75	9.00	5.00	7.00	5.00	14.00
SOUTHERN:								
Cartersville, Ga.	.....	7.50	7.50	5.00	.....	.....	5.00	.....
Knoxville, Tenn.	.....	6.50e	6.00d	6.50e	.....	.....	4.00h	11.50
WESTERN:								
Kirtland, N. Mex.	.....	.....	.....	.....	.....	.....	12.50§	.....
Little Rock, Ark.	.....	12.05	.....	10.60	.....	.....	10.10	17.10
San Francisco, Calif.	‡17.00	12.00j	10.00k	12.00j	11.00	.....	11.00	17.00*

(a) In 100-lb. bags. (b) To 7.50. (c) To 8.00, in 50-lb. paper. (d) To 7.00. (e) To 7.50. (f) To 8.00. (h) To 5.00. (j) To 15.00. (k) To 12.50. §To 15.00. *Credit for return of empties. ‡Ground (pulverized) lime in paper bags, per ton, 17.60.

Wholesale Prices of Slate

Lowest prices f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 200 mesh, 5.75 per ton, in paper bags.

Slate Granules

Pen Argyl, Penn.—Color, blue-black, per ton..... 5.75*

*In 150-lb. burlap bags, plus 10c for each bag.

Roofing Slate

Prices per square—Standard thickness

City or shipping point	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Bangor, Penn.—						
No. 1 Bangor	9.50	14.00	20.00	24.00	35.00	45.00
No. 1 Ribbon	7.50	10.00	15.00	20.00	30.00	40.00
Chapman Quarries, Penn.—						
Smooth texture	8.00– 8.75	.....	.....	.....	.....	.....
Rugged	9.00–10.50	a11.00	b16.00	c18.50	d22.00	e27.00
Pen Argyl, Penn.	.....	9.00	13.00	16.00	22.00	27.00

Albion blue-grey roofing slate, No. 1 clear, 4.13–4.88; mediums, 4.13–4.50; No. 1 ribbon, 4.13–4.50; punching, all sizes, 25c per square.

(a) To 14.00. (b) To 18.00. (c) To 22.00. (d) To 28.00. (e) To 33.00.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

Camden, N. J.:
8x8x16-in. (cinder), each ..... .15

Camden, Ind.:
8x8x16, common, each, .11½; faced, each.. .13

Omaha, Neb.:†
8x12x16-in., ea. .16 8x8x16-in., ea..... .12
8x 3x16-in., ea. .07½ 8x4x16-in., ea..... .07½

Peoria, Ill.:
8x8x16-in., ea... .10 8x12x16-in., ea..... .16
8x4x16-in., ea... .07

Lexington, Ky.:
8x8x16-in., each ..... .16

Richmond, Ind.:
8x8x16-in., plain, each, 11; faced, each..... .14

Wichita, Kan.:
8x8x16-in., ea... .08 4x8x16-in., ea..... .07
Glazed face
8x8x16-in., ea... .14 4x8x16-in., ea..... .12

†Delivered in city. Faced block 2c more than prices given.

Cement Drain Tile

Camden, Ind.*—Price per 1000 ft.

5-in.	36.00	18-in.	405.00
6-in.	42.00	20-in.	475.00
7-in.	63.00	22-in.	575.00
8-in.	72.00	24-in.	675.00
10-in.	96 00	27-in.	945.00
12-in.	135.00	30-in.	1350.00
14-in.	225.00	32-in.	1800.00
15-in.	270.00	36-in.	2700.00
16-in.	302.00		

Richmond, Ind.—Price per foot:

4-in.	.03	8-in.	.08
5-in.	.04	10-in.	.12
6-in.	.05	12-in.	.16

Wichita, Kan.:
6-in. ..... .07

*Machine made, steam cured, square ends for farm drainage.

Cement Building Tile

Lexington, Ky.:
5x8x12, per 1000 ..... 55.00
4x5x12, per 1000 ..... 30.00

Wichita, Kan.—Duntile:

8x8x12	.08	4x5x12	.06
6x8x12	.07½	4x4x12	.04½
6x6x12	.07		

Concrete Brick

Prices given per 1000 brick, f.o.b. plant.

	Common	Face
Longview, Wash.	16.50	†22.00
Milwaukee, Wis.	12.00	20.00
Peoria, Ill.	12.00*	.....

†And higher. *Less 5%.

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Mt. Pleasant, Tenn. — B.P.L., 75%, screened machine lump, per ton, 6.25; hand mined kiln lump 4.00– 6.00

B.P.L. 72%, per ton 5.00– 5.50

Ground Rock
(2000 lb.)

Mt. Pleasant, Tenn.—
Ground rock, B.P.L. 72½% (33% phosphoric acid), per ton in bulk, 11.00; in paper bags, 12.50; in cotton bags 13.25

Ground rock, B.P.L. 72%, per ton.... 4.75– 5.25

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.—Ground talc, 70 mesh, per ton in bags 5.50
Ground talc, 200 mesh and finer, in 50-lb. paper or 200-lb. burlap bags, per ton 6.00–10.00
Pencils and steel workers' crayons, per gross 0.75– 1.55

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99½% thru 200 mesh, 7.50–8.00; Grade B, 97-98% thru 200 mesh 6.50– 7.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of burlap bags. Terms 1%, 10 days.

Emeryville, N. Y.:
Crude ground talc (200 mesh), bags.. 13.75
Ground talc (325 mesh), bags..... 14.75

Henry, Va.—Crude talc, mine run, per ton 3.50– 4.50
Ground talc, 150-200 mesh, per ton in bags 4.70– 4.90

Los Angeles, Calif.—Ground talc, 150-200 mesh, per ton, in bags 15.00–25.00

Natural Bridge, N. Y.:
Ground talc (325 mesh), in 50-lb., 100-lb. and 200-lb. bags, per ton..... 10.00–20.00

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Joliet, Ill.—All passing 100 mesh, f.o.b. Joliet, including cost of bags 22.00

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4-in.	6-in.	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich.																	
Sewer	.....	.09	.14	.21	.27	.36	.75	.90	1.20	1.35	1.95	2.16	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.55	.60	1.00	1.35	1.60*	.....	1.80	2.00	2.25	3.10	4.00	5.10	6.00	7.45
Danbury, Conn.	24x30-in. tongue and groove pipe for tiling wells, 2.00 per ft., f.o.b. plant.																
Newark, N. J.	.10	.15	.25	.30	.45	.60	.90	1.20	1.30	1.60	2.00	2.20	3.00	4.00	5.00	6.50	8.00
Mercedes, Tex.																	
Irrigation	.....	.16	.19	.24	.29	.40†	.60	.74	.....	1.13	.....	1.77	.....	.....	.....	.....	.....

Wahoo, Neb. ..... 12-in., 15-in., 18-in., 24-in., and from 30-in. to 60-in. pipe, per ton, 10.50.
†14-in. pipe; 16-in. pipe, 50c. *21-in. pipe.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

City or shipping point	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ½x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Grand Rapids, Mich.	.....	1.50	7.00	.....	10.00	10.00	19.50	8.00	26.00	21.00	15.00	15.00	27.00
Los Angeles, Calif. (r)	.....	.....	8.02p	.....	12.40q	.....	13.40q	.....	.....	.....	.....	.....	.....
Medicine Lodge, Kan.	1.15	8.00b	.....	.....	.....	.....	11.50b	.....	16.00b	.....	.....	.....	.....
Port Clinton, Ohio	4.00	6.00–8.00	6.00–8.00	10.00m	10.00n	10.00n	20.00k	8.00–11.00	24.50f	26.00g	15.00h	15.00h	27.00j

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) To 15.40 per ton. (b) Includes paper bags. (c) Includes jute sacks. (f) To 27.50. (g) To 29.00. (h) To 16.00. (j) To 28.00. (k) To 23.00. (m) To 12.00. (n) To 13.00. (p) To 9.02. (q) To 14.40 per ton. (r) Plaster board, 16x48—⅛ in., per yd., 14½c; 16x48—⅜ in., per yd., 16½c.

Bureau of Standards Tests for Proportioning Concrete

ALTHOUGH thousands of tests have been made to determine the laws for proportioning concrete in order to secure the highest strength at the least cost, there are so many possible combinations of the ingredients that the formulation of a simple rule to cover all cases has defied the most expert. No two sands are exactly alike in fineness, and there are wide variations in texture and strength of the particles. The same may be said regarding the gravel or other coarse aggregates. Different cements also behave differently. Although most cements now on the market are satisfactory as judged by the government specifications, some barely pass and others give strengths considerably in excess of the requirements. Besides this, an excess in the amount of water used in the mix over that necessary to give sufficient plasticity to the concrete to permit it to be worked into the corners of the forms and around the reinforcement seriously reduces the strength.

The U. S. Bureau of Standards has made tests, the results of which form the basis of a paper to be published in the Proceedings of the American Society of Civil Engineers, in which an effort has been made to formulate rules which will simplify the procedure in many cases. Although this investigation included tests with 232 combinations with different cements, different proportions of fine aggregate (sand) to coarse aggregate, and different sizes of coarse aggregate, these 232 combinations represent only a small proportion of the possible combinations. The tests which were made indicate that for some cases there should be as much fine aggregate as coarse aggregate, while for other cases the volume of the fine may be as little as one-half that of the coarse aggregate, but that for the majority of cases the volume of fine should be about two-thirds that of the coarse aggregate. The tests also indicated that the combination of aggregates which gives the mix most easily worked into the forms is likely to require the least cement to give the strength necessary.—*Technical News Bulletin* of the U. S. Bureau of Standards.

Current Prices of Ready-Mix Concrete

AMARILLO, TEX.—Prices per cu. yd.*

Lime Mortar

Mix	
1–4	6.50
1–4½	6.25
1–5	6.00

Topping

Mix	
1–1 –0	13.75
1–1½–0	12.75
1–2 –0	11.75
1–2½–0	11.25
1–3 –0	10.75
1–3½–0	10.25

Base

Mix	
1–2 –3½	9.25
1–2¼–4	9.00
1–3½–4½	8.00

Terrazzo

Mix	
1–3 –0	9.00
1–3½–0	8.50
1–4 –0	8.00
1–4½–0	7.75
1–5 –0	7.50

Base—Strength

4000 lb. per sq. in.	9.50
3500 lb. per sq. in.	9.00
3000 lb. per sq. in.	8.75
2500 lb. per sq. in.	8.50
2000 lb. per sq. in.	8.25
1500 lb. per sq. in.	8.00

Mix	
1–3–5	8.00
1–4–6	7.25

*For orders of 50 cu. yd. or more, prices are 75c less per cu. yd. than quoted. Free delivery within city limits for 1 cu. yd. or more per load; $1.00 per load extra for less than 1 cu. yd. loads, except to finish a job. Additional charge of 10c per mile per cu. yd. for deliveries outside of city limits.

BELLINGHAM, WASH.—Prices per cu. yd.¶

Mix	Retail, f.o.b. bunkers	In carloads	Mix	Retail, f.o.b. bunkers	In carloads
1–3–4	6.85	6.10	1–2–3	7.65	6.91
1–3–5	6.45	5.75	1–2–4	7.05	6.50

¶Additional charges for delivery to various zones. First zone, added charge of 75c per cu. yd.; second zone, added charge of $1.05; third zone, added charge of $1.40; fourth zone, added charge of $1.75.

BOSTON AND CAMBRIDGE, MASS.—Price per cu. yd. for orders of 30 cu. yd. and over.‡

Mix		Mix	
1–2 –4	6.50	1–1½–3	7.05
1–3 –6	6.00	1–1 –2	7.80
1–2½–5	6.25	1–2	9.50
1–2 –3	6.95		

‡Discount of 50c per cu. yd. allowed on deliveries made between the 1st and 15th of the month if bill is paid on or before the 25th and on deliveries made between 15th and 30th if paid on or before the 10th of following month.

CHAMPAIGN, ILL.†—Prices per ton (weight, 4000 lb. per cu. yd.)

Mix		Mix	
1–2–3	3.50	1–3–5	3.25
1–2–4	3.37½		

†Discount to contractors. Prices subject to cash discount of 5% for payment by 10th of month following delivery.

COLUMBUS, OHIO—Delivered prices per cu. yd.

Mix	Zones§ 1	2	3	4	5	6	7	8	9	10
1–1½–3	6.05	6.20	6.35	6.50	6.65	6.80	6.95	7.10	7.25	7.40
1–2 –3	5.80	5.95	6.10	6.25	6.40	6.55	6.70	6.85	7.00	7.15
1–2 –3½	5.60	5.75	5.90	6.05	6.20	6.35	6.50	6.65	6.80	6.95
1–2 –4	5.40	5.55	5.70	5.85	6.00	6.15	6.30	6.45	6.60	6.75
1–2½–4	5.25	5.40	5.55	5.70	5.85	6.00	6.15	6.30	6.45	6.60
1–3 –4	5.15	5.30	5.45	5.60	5.75	5.90	6.05	6.20	6.35	6.50
1–2½–5	5.00	5.15	5.30	5.45	5.60	5.75	5.90	6.05	6.20	6.35
1–3 –5	4.90	5.05	5.20	5.35	5.50	5.65	5.80	5.95	6.10	6.25
1–3 –6	4.75	4.90	5.05	5.20	5.35	5.50	5.65	5.80	5.95	6.10
1–4 –8	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85
1–2	7.45	7.60	7.75	7.90	8.05	8.20	8.35	8.50	8.65	8.80
1–3	6.60	6.75	6.90	7.05	7.20	7.35	7.50	7.65	7.80	7.95

§All zones radiating from center of city. Zone 1 is one mile in radius, zone 2 is two miles in radius, zone 3 is three miles in radius, etc. Cash discount: 25c per cu. yd. 10th of month following date of delivery. Orders for less than 2 cu. yd. will carry same haul charge as 2 cu. yd. Orders for 2 cu. yd. or over will be delivered in full loads at 2 yd. or more. No extra charge will be made for finishing load if less than 2 cu. yd. Fifteen minutes allowed to unload. Additional time charged at rate of $2.00 per hour. All prices subject to revision to conform to current costs of materials.

DALLAS, TEX.†

Strength	Slump ½ in. to 1 in.	3 in. to 4 in.	6 in. to 7 in.	Strength	Slump ½ in. to 1 in.	3 in. to 4 in.	6 in. to 7 in.
1500	5.25	5.45	5.75	2500	5.80	6.00	6.30
2000	5.55	5.75	6.05	3000	6.15	6.45	6.75

Fixed Mixes (any slump)

1–2½–5	6.45	1–2–4	6.75	1–1½–3	7.45

†Prices subject to 2% 15 days and are based on quantities of 50 to 999 cu. yd. and on delivery in 2½-cu. yd. loads within Zone 1, which extends about 1½ miles from either of two plants. Zone charges are approximately 10c per cu. yd. per mile beyond the Zone 1 limit. On quantities under 50 cu. yd. add 20c and on quantities over 1000 cu. yd. deduct 30c.

CLEVELAND, OHIO (a)—Prices per cu. yd. to contractors.

Public Square basing point

Aggregate: Limestone

Mix	1st mile	Mix	1st mile
1–1 –2	8.70	1–2½–5	6.60
1–2 –3	7.40	1–3 –5	6.50
1–2½–3	7.20	1–3 –6	6.30
1–2 –4	7.00	1–4 –8	5.90
1–2½–3½	7.00	1–2 Finish	9.25
1–2½–4	6.90	1–2½ Finish	8.50
1–3 –4	6.75	1–3 Finish	7.75

(a) Add 20c per yd. to above prices for each additional mile up to four miles; beyond this, for each additional mile add 10c per yd. On orders of 50 yd. or more, contractors quoted 50c per yard less. No discount for quantity to industrials or consumers. On orders of less than 10 yd. to the one-time buyer class, add $1 per yard. Extra charge for concrete delivered nights, Sundays or holidays, $1 per yard over daytime schedule. For high-early-strength or waterproofing cements, add $2 per yard. Minimum delivery, 1 yd. Prices quoted are based upon normal discharge of the load within 20 minutes after arrival of truck. A demurrage charge of $1 will be made for each 15 minutes thereafter.

DES MOINES, IOWA—Prices per cu. yd. (b)

(Made with ¾-in. gravel for structural work)

Mix	Slump	Plant price	Zone A	B	C	D
1–2½–5	2-in.	6.00	6.50	6.75	7.00	7.25
1–2½–5	6 in.	6.25	6.75	7.00	7.25	7.50
1–2 –4	2 in.	6.50	7.00	7.25	7.50	7.75
1–2 –4	6 in.	6.75	7.25	7.50	7.75	8.00
1–2 –3½	2 in.	7.00	7.50	7.75	8.00	8.25
1–2 –3½	6 in.	7.25	7.75	8.00	8.25	8.50
1–2½–3	2 in.	7.50	8.00	8.25	8.50	8.75
1–2½–3	6 in.	7.75	8.25	8.50	8.75	9.00

(Made with pea gravel for cellar and sidewalks)

Mix	Slump	Plant price	Zone A	B	C	D
1–2½–5	2 in.	5.75	6.25	6.50	6.75	7.00
1–2½–5	6 in.	6.00	6.50	6.75	7.00	7.25
1–2 –4	2 in.	6.25	6.75	7.00	7.25	7.50
1–2 –4	6 in.	6.50	7.00	7.25	7.50	7.75
1–2 –3½	2 in.	6.75	7.25	7.50	7.75	8.00
1–2 –3½	6 in.	7.00	7.50	7.75	8.00	8.25
1–2½–3	2 in.	7.25	7.75	8.00	8.25	8.50
1–2½–3	6 in.	7.50	8.00	8.25	8.50	8.75

(b) Discount of 50c per cu. yd. allowed on deliveries made between the 1st and 15th of the month if bill is paid before the 25th and on deliveries made between 16th and 30th if paid before the 10th of following month. Quick setting $2.00 per cu. yd. extra; waterproofing, $2.00 per cu. yd. extra. Each zone approximately one mile.

FAIRMONT, W. VA.—Prices per cu. yd. (c)

Mix	Quantity	Delivered	Called for
1–2–4	Less than 1 cu. yd.	11.00	10.00
1–2–4	From 1 to 4 cu. yd.	10.00	9.00
1–2–4	From 5 to 10 cu. yd.	9.50	8.50
1–2–4	From 11 to 49 cu. yd.	9.00	8.00
1–2–4	From 50 cu. yd. and up	8.50	7.50

(c) For 1–2–3 mix add 50c per cu. yd. to prices quoted; for 1–3–5 mix deduct 50c per cu. yd. from prices quoted.

MEMPHIS, TENN.—Prices per cu. yd. delivered in city.†

Strength	Portland	"Incor"	Strength	Portland	"Incor"
1800 lb.	6.50	7.30	3000 lb.	8.00	9.25
2000 lb.	7.00	8.00	3500 lb.	8.60	10.00
2500 lb.	7.50	8.50	4000 lb.	9.80	11.75

†Above prices based on gravel for aggregate. If stone is wanted for aggregate, additional charge of $1.00 per cu. yd. is made to above prices. 5% cash discount for payment 10th of month following date of invoice.

MORGANTOWN, W. VA.—Prices for 1–15 cu. yd., delivered within one mile radius of plant. (f)

Mix		Mix	
1–2 –3	9.25	1–2½–5	8.25
1–2 –4	8.75	1–2	12.25
1–2½–4	8.65	1–3	10.50

(f) Discount of 5% allowed for payment 15 days from date of invoice.

OMAHA, NEB.*—Prices per cu. yd. for quantities from 1 to 300 yd., delivered anywhere within the city.

28-day strength		28-day strength	
No. 1. 3500 lb. sq. in.	6.75	No. 3. 2500 lb. sq. in.	6.25
No. 2. 3000 lb. sq. in.	6.50	No. 4. 2000 lb. sq. in.	6.00

Transit-Mix Concrete

28-day strength		28-day strength	
No. 1. 3600 lb. sq. in.	6.90	No. 3. 2600 lb. sq. in.	6.40
No. 2. 3100 lb. sq. in.	6.65	No. 4. 2100 lb. sq. in.	6.15

*Sand-gravel mix used as aggregate. No. 1, 6 sacks cement per cu. yd. concrete; No. 2, 5½ sacks cement; No. 3, 5 sacks cement; No. 4, 4½ sacks cement. For high-early-strength concrete using "Quikard" or other supercement, add $2.50 per cu. yd.

NEWARK, N. J. §

1–2 –4	7.00		1–3 –5		6.50
1–2½–5	6.60		1–3 –6		6.25

§Discount of 2% if paid by 10th of month following delivery.

NEW ORLEANS, LA. (h)—Plant prices per cu. yd. for 1 to 50 yd.

Mix	Cement Portland	Cement "Incor"	Mix	Cement Portland	Cement "Incor"
1–4 –8	5.65	6.50	1–2 –3	7.45	9.45
1–3 –6	6.10	7.25	2–3 –6	8.30	10.60
1–3 –5	6.40	7.70	1–1½ topping	10.55	14.95
1–2½–5	6.65	8.10	1–2 topping	9.45	13.15
1–2½–4	6.80	8.35	1–3 topping	7.85	10.55
1–2 –4	7.05	8.75			

Plant prices per cu. yd., 50 cu. yd. and over

1–4 –8	4.75	5.55	1–2 –3	6.15	8.00
1–3 –6	5.10	6.15	2–3 –6	6.90	9.05
1–3 –5	5.30	6.50	1–1½ topping	8.55	12.70
1–2½–5	5.50	6.85	1–2 topping	7.65	11.10
1–2½–4	5.60	7.10	1–3 topping	6.30	8.85
1–2 –4	5.80	7.45			

(h) All prices subject to 5% discount 15 days, 30 days net. Haulage based on various zones.

NEW YORK CITY, N. Y.‡—Prices per cu. yd.

Manhattan and Bronx

Mix		Mix	
1–1½–3	9.50	1–1½–3	8.50
1–2 –4	8.50	1–2 –4	8.00
1–2½–5	8.25	1–2½–5	7.75
1–3 –6	7.75	1–3– 6	7.50

Westchester County (within radius of 7 miles)

1–1½–3	9.25	1–2½–5	8.00
1–2 –4	8.50	1–3 –6	7.50

Brooklyn

Mix	Under 50 cu. yd.	Over 50 cu. yd.	Mix	Under 50 cu. yd.	Over 50 cu. yd.
1–1½–3	9.50	8.50	1–2½–5	9.00	7.75
1–2 –4	9.25	8.00	1–3 –6	8.75	7.50

‡Special designed mixes on the strength basis priced according to the strength desired.

WILKES-BARRE, PENN.—Prices per cu. yd.

Mix		Mix	
1–3 –6	7.00	1–2–4	7.50
1–3 –5	7.00	1–2–3	7.75
1–2½–5	7.25	1–2	11.00

PITTSBURGH, PENN.—Prices shown are per cu. yd., from 2 to 15 yd.(j)

Mix	Strength		Mix	Strength	
1–1½–2½	4000 lb.	8.45	1–2½–4½	2500 lb.	7.60
1–2 –3	3500 lb.	8.10	1–2½–5	2500 lb.	7.45
Class A	3500 lb.	6.95	1–3 –5	2000 lb.	7.35
1–2½–3½	3000 lb.	6.85	1–3 –6	1500 lb.	7.25
1–2 –4 Class B)	3000 lb.	7.75			

(j) Class A concrete is a special concrete prepared for the city of Pittsburgh. Prices vary according to zones. Dealer's commission of 50c per cu. yd. allowed. No commission allowed over 200 cu. yd. Prices subject to cash discount of 25c per cu. yd. for payment 15 days from date of invoice. Under 2-yd. delivery a charge of $2 per cu. yd. will be made.

PUEBLO, COLO.—Prices per cu. yd.‖

Ready-Mixed Concrete

	Zone 1	Zone 2	Zone 3	Strength, 28-day test
Grade A	7.40	7.60	7.80	3000-lb.
Grade B	7.10	7.30	7.50	2700-lb.
Grade C	6.75	6.95	7.15	2400-lb.
Grade D	6.60	6.80	7.00	2100-lb.
Grade G	6.10	6.30	6.50	1500 lb.

Cement Mortar

Mix	Zone 1	Zone 2	Zone 3	Mix	Zone 1	Zone 2	Zone 3
1–2	10.00	10.20	10.40	1–3	8.50	8.70	8.90

‖Deduct 50c per cu. yd. for orders of 10 yd. or more. For delivery outside of city, add 20c per mile beyond Zone 3.

SAN JOSE, CALIF.—Prices per cu. yd. delivered within one mile of plant. (k)

Mix	Up to 5 cu.yd.	Over 5 cu.yd.	Mix	Up to 5 cu.yd.	Over 5 cu.yd.
1–6	9.00	8.50	1– 9	8.00	7.50
1–7	8.50	8.00	1–12	7.00	6.50

(k) For deliveries outside of this area add 30c per cu. yd. per mile. Cash discount of 50c per cu. yd. if paid in full by 10th day of following month.

SANTA CRUZ, CALIF.—Price per cu. yd. delivered within two-mile radius of plant. (l)

Mix	Over 5 cu. yd.	Less than 5 cu. yd.	Mix	Over 5 cu. yd.	Less than 5 cu. yd.
1–6 (6 sacks cement)	8.50	9.00	1–8 (4½ sacks cement)	7.60	8.10
1–7 (5 sacks cement)	8.00	8.50	1–9 (4 sacks cement)	7.40	7.90

(l) For deliveries outside of this area add 30c per cu. yd. per mile. Cash discount of 50c per cu. yd. if paid in full by 10th day of following month.

Outlines Program to Promote Federal Relief Construction

A REVIEW of the local benefits possible and how the $2,000,000,000 relief bill makes such needed construction possible is contained in an information circular recently issued by the Universal Atlas Cement Co., Chicago, Ill.

The circular explains the different sections of the law, lists typical projects for which loans have been made, then outlines a program of procedure for making loan applications for local self-liquidating projects. A suggested publicity story is also included. This material is available to those wishing to promote such projects.

Sand-Lime Brick Production and Shipments in September

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Sixteen sand-lime brick plants reported for the month of September, this number being one more than the number reporting for the month of August, statistics for which were published in our issue of September 24.

Reports for the month of September indicate a slight reduction in sand-lime brick production. Rail shipments show an increase, while a decrease is shown in truck shipments. Stocks on hand also show an increase and unfilled orders a decrease.

Average Prices for September

Shipping point	Plant price	Delivered
Detroit, Mich.	$10.00	$11.00-12.50
Flint, Mich.	11.00	12.50
Grand Rapids, Mich.	.....	12.50
Medfield, Mass.	8.00	9.00-10.00
Milwaukee, Wis.	8.50	10.50
Minneapolis, Minn.	6.00	7.50
Mishawaka, Ind.	8.25	.....
Pontiac, Mich.	10.50	12.50
Saginaw, Mich.	10.00	.....
Syracuse, N. Y.	18.00	20.00
Toronto, Ont., Can.	12.00	13.50

Statistics for August and September

	*August	†September
Production	2,537,173	‡2,523,072
Shipments (rail)	175,880	454,900
Shipments (truck)	2,508,457	1,807,506
Stocks on hand	4,150,913	5,897,620
Unfilled orders	5,923,000	2,253,846

*Fifteen plants reporting. Incomplete, five not reporting unfilled orders. †Sixteen plants reporting; incomplete, one not reporting stocks on hand, and six not reporting unfilled orders. ‡Includes 28,222 double brick.

Notes from Producers

Grande Brick Co., Grand Rapids, Mich., reports delivery of over 840,000 sand-lime brick for civic auditorium at Grand Rapids.

Walker and Frank Brick Co. reports that it will soon begin to make deliveries on post office job at Detroit.

Medfield Brick Co., Medfield, Mass., has purchased outright the assets of American Brick Co., Boston, Mass. Fredric S. Snyder is president of the Medfield concern; C. H. Carmichael, general manager, and A. A. Robert, sales manager. The company reports receiving orders for sand-lime brick for the Dorchester high school at Boston, and pathological building of the Boston City hospital. It has recently completed sand-lime brick deliveries for the Norfolk state prison colony and Wheaton Seminary at Norton, Mass.

Three Eastern Quarries Merge

INCORPORATION papers for the Construction Materials Co., a consolidation of three Maryland quarry concerns, have been filed with the Maryland State Tax Commission. It is capitalized at $350,000, with all stock subscribed.

The three properties combined in the new company are the quarries of Thomas P. Murray, at Loch Raven; the Port Deposit Granite Co., and the Woodstock Quarries at Granite. Mr. Murray is president of the new corporation; Harvie R. Williams, vice-president, and J. Wesley McAllister, secretary and treasurer.

Mr. Murray has long been active in the stone business. Mr. McAllister was sheriff of Hartford County for twelve years and Mr. Williams was formerly secretary and director of sales for the National Lime and Stone Co.

At present the headquarters of the company are at Port Deposit, but in the near future headquarters will be established in Baltimore City.—*Towson* (Md.) *Jeffersonian.*

Phosphate in the Tennessee District

WEATHER CONDITIONS in the Columbia, Tenn., phosphate district have been most unfavorable for operations of the small hand miner. Continued rains have made it practically impossible to produce and ship on an economical basis from the small operations. Had these producers operated during the summer when weather conditions were favorable they might now be shipping in comparatively large volume from stock.

The large companies, some of which have machine prepared lump available, expect to profit as a result of this condition, which eventually will mean higher prices. As yet no purchases appear to have been made above the figure of $3.75 basis 72% B.P.L. No demand has come from the fertilizer channels nor from the high phosphorous pig iron producers. When it does come supplies will be hard to find at a reasonable price.

Practical research is expected to start soon on a process lately developed by the staff of one of the universities in which a dry, white product containing 20% available phosphoric acid can be made from run of mine phosphate rock containing only 50% B.P.L., using less acid than is required to make 16% superphosphate from 72% rock.

Considerable interest has resulted from the address by Dr. M. C. Ford on the proper use of phosphates. He said that the agriculture of the Mississippi valley outside of the Blue Grass region of Kentucky and the Middle Basin of Tennessee is rapidly reaching the point where the yields obtained will be in proportion to the phosphate fertilizer used. He showed that 1,225,000 tons of phosphate rock annually would be required by farmers in order to balance the phosphorus removed by their crops. This is four to five times the present production of the Tennessee field, three times its normal production, and twice as much as the largest production known. He said that both rock- and super-phosphate gave good results and should be used widely.

Plan Two New Gravel Plants in San Francisco Area

IN ANTICIPATION of orders which are expected to result from the construction of two new San Francisco Bay bridges, owners of gravel plants in the vicinity of Pleasanton are preparing for runs this winter, the *Oakland* (Calif.) *Tribune* states. It is understood that the bulk of the gravel to be used in the concrete is to be purchased in this area.

As engineers have stated that the present plants in Livermore valley do not have sufficient capacity to supply all of the gravel. It is understood that two new companies are planning to open deposits near Livermore. One of these plants, it is asserted, will cost approximately $500,000.

Recovering Waste Products

THE Universal Exploration Co., which operates a large zinc mine at Jefferson City, Tenn., has recently undertaken the sale of some of its byproducts in the rock products field, and in order to do so has installed some new equipment. The installation included a Traylor crusher for primary breaking and Symons cone crushers for secondary breaking. Large ball mills further reduced the material until it passes 20-mesh.

A large jig, manufactured by the Rogers Foundry and Manufacturing Co., Joplin, Mo., has now been placed in the plant and most of the chats are run over this jig before being sent on to the ball mills. By "floating" in this jig the lighter stone passes off at the top while the heavier ore is retained at the bottom. Thus it is not necessary to run the stone through the ball mills, resulting in a saving in their operation, and at the same time furnishing the company with a salable stone product. The stone is suitable for concrete work as well as for crushed stone roads and penetration type roads. Agstone is another byproduct of this plant. The zinc process is one of flotation, and the tailings left after the metallic portion is removed are carried by flume out to a large tailing dump. The Universal company is now selling these tailings to farmers and expects to do a good business with this material.

Milwaukee Producer Increases Operations 100 Per Cent

THE United Materials Corp., Milwaukee, Wis., reports an expanded market has forced a 100% increase in operations in its sand and gravel division, where the plant has worked on a double shift of 16 hours a day for the last six weeks.

The report, given by officials of the company, indicated a large percentage of the material ordered is moving directly to various public construction jobs.

Though the plant is now operating slightly in excess of the present demand, an even greater market is anticipated, and the double shift will be continued as long as weather permits, to accumulate a surplus of materials to accommodate building operations and concrete construction projects scheduled for early spring, officials asserted.—*Milwaukee* (Wis.) *Sentinel.*

Drop Receivership Request

EQUITY PROCEEDINGS started in the Northampton County, Penn., court by preferred stockholders last May, asking for the appointment of a receiver for the Keystone Portland Cement Co. were discontinued October 13 by F. E. Walter, attorney for the plaintiffs. The plaintiffs had found the affairs of the company in a satisfactory condition, it was said.—*New York* (N. Y.) *Times.*

Praise High Quality of Ready Mixed Concrete

PRODUCERS of ready-mixed concrete should appreciate the tribute recently paid the General Materials Co., St. Louis, Mo. It definitely shows how quality production is recognized and how it can help win wider acceptance and use for ready-mixed concrete. The tribute was in the form of a news story appearing in the *St. Louis Star-Times* and read as follows:

"A notable feature of the entire I. T. S. terminal project has been the exceptionally high quality of construction maintained throughout. For the concrete work, for instance, a very rigid specification was prepared, which required the use of the most modern methods developed by engineers for the preparation of concrete.

"Several contractors on early stages of the construction turned to the ready-mixed concrete service of the General Material Co. The results were so satisfactory to the railroad officials that arrangements were made for the General Material Co. to supply ready-mixed concrete on all of the subsequent I. T. S. construction. The material company erected an additional concrete mixing plant near Franklin and Hadley to facilitate serving the I. T. S. work as well as other downtown construction.

"All devices for the production of concrete in the most scientific manner were installed in the plant, which has been called one of the most accurately controlled plants constructed.

"Ordinary concrete, according to builders and others, is considered satisfactory when the average compressive strength at 28 days is over 2000 lb. per sq. in. The concrete for the floors and columns in the Midwest Building average 4200, it is stated.

"The result of the complete cooperation between the railroad, the contractors and the material company has been, in the opinion of many builders, the highest type of concrete job in the vicinity of St. Louis."

To Store Aggregate with Reconstruction Finance Corp. Loan

A REPRESENTATIVE of the United States Department of Agriculture was in Carrollton, Mo., recently and, together with the chairman of the county highway commission, leased three acres of land. This acreage will be used to pile rock and sand in anticipation of the widening of Route 24.

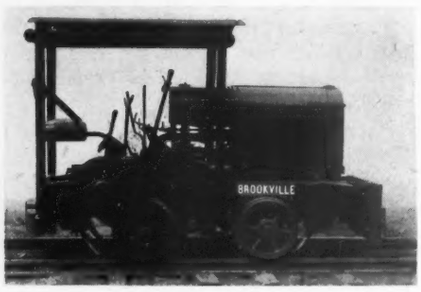
Although the work of paving will probably not be started for several years, the material will be placed in readiness for future use at the present time to help the unemployment situation there. The rock and sand will be shipped to Wakenda and will be hauled to the site leased.

This work is the result of the Reconstruction Finance Corp. advancing funds to the state highway commission.—*Carrollton* (Mo.) *Republican.*

New Machinery and Equipment

Small Locomotive

THE Brookville Locomotive Co., Brookville, Penn., has announced its new "B-I-30" Series of locomotives supplied standard in all gages, in 4, 5, 6 and 7 tons weight. They have a speed range, both forward and reverse, from 2 to 15 mi. per hr., with engine power above the average used in locomotives of this weight, the manufacturer states.



Made in 4, 5, 6 and 7 tons

The power unit is the new "I-30" McCormick-Deering industrial tractor. Locomotive features have been held to essentials, including a heavy unbreakable steel frame, sanders, dual brakes, dual spring journal boxes, etc. Brookville steel tired drive wheels are standard equipment.

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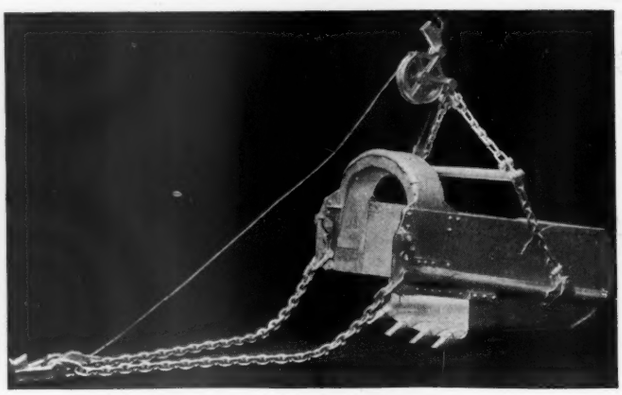
Dragline Bucket

THE Wellman Engineering Co., Cleveland, Ohio, announces improvements to its type "DL" Williams dragline bucket. These improvements include welded stiffeners extending the full length of the bucket on the outside, interlocked with the bail attaching brackets; quick-opening hinged hitch which permits the use of a solid one-piece attaching clevis, enabling the operator to quickly set the drag chains at the best digging angle; its sidewalls are reinforced with an angle welded to the plate between the arch and back strap; it has a special box-section steel casting arch; it is fitted with the "Williams" patented teeth having reversible points and the lip is of special heat-treated steel; and it has the tubular design of spreader-bar with improved end fittings, and also a special three-way swivcled link and an improved sheave block.

Another feature is the wearing shoes, which are forged or welded to the sides of the contacting chain links, for bearing against strips provided on the sides of the bucket.

One other feature is the drag cable socket which has two hooks, or spurs, on the inside for attachment of the rings at the front ends of the main drag chain. All wearing thus takes place between the casting and the rings, the manufacturer states.

These features have been incorporated without increase in weight, according to the manufacturer. These buckets are built in sizes ranging from 1¼ to 3 cu. yd. rated capacity.



Increased strength without increase in weight

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Improves Trucks

THE Four Wheel Drive Auto Co. of Clintonville, Wis., has announced a complete new line of heavy-duty trucks for 1933. The models range in size from the 2 to 2½ ton four-wheel-drive to the 15-ton six-wheel drive, and incorporate many new improvements. Special mention is made of three primary models, featured for use in the major FWD markets; they are the H6 of 2-2½ tons capacity, for road maintenance, the CU6 of 3½-4 tons capacity, for road building and snow removal, and the X6.

The CU6 of 3½-4 tons capacity is said to have many mechanical advantages over its predecessors. The cab is of the aerodynamic type with an internal sun visor and has all the appointments of a pleasure car, including rear-view mirror, windshield wiper, and a redesigned dash.

The motor in this model is a six-cylinder seven-bearing crankshaft unit, rated at 91 hp. There are five speeds forward and one reverse in the heavy-duty sliding jaw clutch transmission, providing a speed of 32 mi. per hour in the standard 7.35 to 1 gear ratio.

Six-cylinders, with five forward speeds

Optional ratios give speeds of 19.5 mi. per hour to 41 mi. per hour in high gear, depending on the customer's requirements.

The wheelbase is 147 in. with three others optional, that is, 159 in., 169 in., and 179 in. can be furnished if desired. The tread has been increased from 60 to 72 in. and the motor, transmission, etc., lowered 4 in. The turning radius is also shortened.

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To Sell SKF Drill Steel

ARRANGEMENTS have been made whereby Ingersoll-Rand Co., New York, N. Y., has acquired exclusive rights to market SKF drill steel throughout the world. The product is being sold under the trade name IR-SKF.

This brand of steel, which is claimed to be of unusually high quality, was developed by the technical departments of Ingersoll-Rand Co., in collaboration with the SKF mills.

The high power and fast speeds of modern rock drills require a high quality drill steel with long fatigue life to resist breakage and to give fast cutting power. It is said that IR-SKF steel meets these requirements and that at the same time it is easy to shape and sharpen and that it will hold its cutting edge and gage through a long period of service.

IR-SKF steel is available in all standard sizes and sections in both solid and hollow forms. The hollow steel is made by the SKF "supersmooth" hole process, which is claimed to produce an absolutely uniform hole throughout the length of the steel.

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Adds Welding Rods

THE Champion Rivet Co., Cleveland, Ohio, announces a new line of general purpose welding rods. While the Champion company will still continue to market its rivets, its sales organization will have with it a line of welding rods to offer customers.

Midget Photoelectric Relay

A NEW photoelectric relay has been announced by the General Electric Co., Schenectady, N. Y. This relay is applicable to installations where practically complete interception of the light beam is made. The unit is particularly adaptable to counting applications. The unit will operate on light impulses of one-fifteenth of a second duration. The relay should also find many applications in the limit switch field.

The unit is complete in itself without an enclosing case, but a drawn shell enclosing case is provided to allow mounting on a vertical support.

Where the interrupting capacity of the sensitive relay contact is not sufficient to handle the device to be controlled, a small contactor or magnetic switch may be interposed between the sensitive relay and the controlled device.

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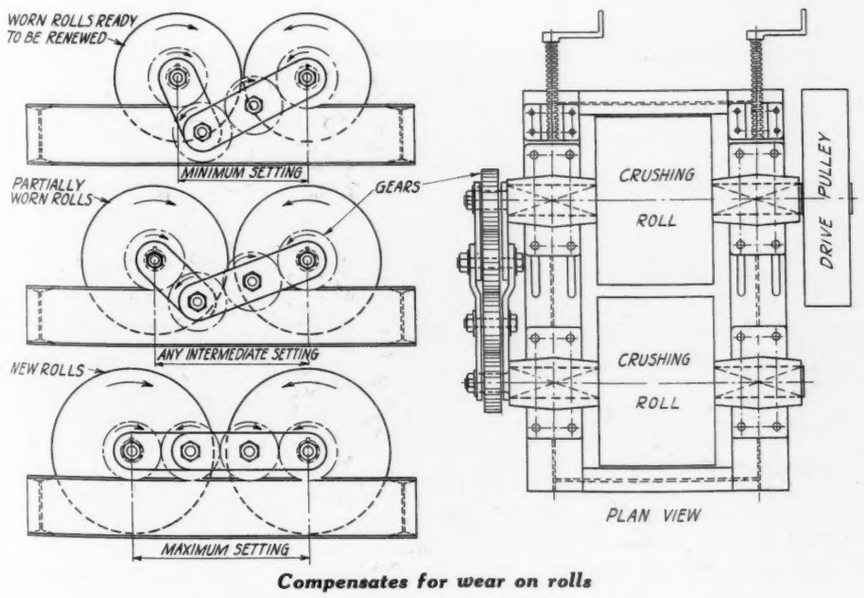
Driving Link for Roll Crushers

A NEW driving arrangement for double roll crushers, consisting of a geared driving link, has been developed and patents applied for by F. M. Welch Engineering Service, Greenville, Ohio.

As shown in the accompanying illustration the arrangement consists of a link connection between the two roll shafts with gears to transmit power from one shaft to the other. It permits different roll settings to give different sized products and to compensate for wear of the roll shells without changing the perfect mesh of the gears. Either roll shaft may be the driving unit and the gears may be varied to give different roll speeds.

It is stated that any amount of power may be transmitted with any relative speed between the two rolls and that maintenance is no greater than for ordinary speed reducers. The links and gears are enclosed in a housing or gear case.



Compensates for wear on rolls

Oversize Caterpillar Mounting for Dragline

A NEW oversize caterpillar mounting is announced by Bucyrus-Erie Co. of South Milwaukee, Wis., for application to its 52-B dragline. This new mounting is extra long, is extra wide and can be furnished with 36- or 42-in. wide links to give greater bearing area than the standard mounting used for solid bottom.

Liberal clearance under the truck frame has been provided, the manufacturer states, and mud guards protect the driving machinery. Steering is controlled from the operator's station on deck. Ends of the two caterpillar belts are tapered to facilitate going through soft places and walking over logs.

The overall length is 21 ft. 2 in. and the overall width is 13 ft. 6 in. The bearing area is 122.5 sq. ft. The 52-B dragline to which this mounting applies is listed as handling a 1½-in. yd. heavy type Bucyrus-Erie drag bucket on a 75-ft. boom.

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Tractor Mounted Air Compressor

THE Cleveland Tractor Co., Cleveland, Ohio, announces that air compressors are now available for all model Cletrac crawler tractors. The capacities of the compressors are from 120 cu. ft. for the Model 15 Cletrac up to 640 cu. ft. for the Model 80 Cletrac.

Advantages claimed for tractor mounted compressors are that it is thus possible to keep the air supply at the work; long hose lines are eliminated; it can be quickly driven out of the way for blasting and can be moved easily to the windward side of the work, thus keeping the unit out of the abrasive dirt created by the operation.

All of these tractors may be used with the air compressors, or the compressors may be removed leaving the standard tractor unit which can be employed for other types of

Does not interfere with regular duties

work. The design and method of mounting the compressor is such that the drawbar of the tractor is left free and the ability of the tractor to do hauling jobs is not impaired.

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Portable Arc Welder

THE P&H Hansen gasoline motor driven arc welder is announced by the Harnischfeger Corp., Milwaukee, Wis. The unit is built in capacities of from 100 to 600 amperes, and is built for quick accessibility, the manufacturer states. Waukesha engines are used, which are equipped with self starters. Easily removed, weatherproof side covers give protection against the elements. The operating control for regulating welding current is on the commutator end of the generator. An auxiliary generator may be obtained to mount on the end of the welding generator to furnish current for light and tool operation.

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Cable Lubricant and Wire Rope Grease Stuffer

A CABLE LUBRICANT is being marketed by the Hodson Corp., Chicago, Ill. Features claimed for this lubricant are that it has a tough, tenacious body; it has a high degree of adhesiveness; it will not become thin and run off the cable when subjected to the highest heats of climatic conditions, nor scale off when subjected to low temperatures; it is highly resistant to water, fresh or salt; and it has considerable resistance to some acids. It is made in different consistencies for different sizes of cables.

The company also makes a wire rope grease stuffer to facilitate the application of the lubricant in the manufacture of cables.

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Stoker Drive Unit

A STOKER DRIVE unit for driving both fan and screw of underfeed domestic and industrial stokers is announced by the Foote Bros. Gear and Machine Co., Chicago, Ill. This new unit is made in three sizes to handle 200, 400 and 600 lb. of coal per hour. Six speed changes are provided. All operating parts are totally enclosed and operate in oil. Extreme quietness is a feature claimed for this unit.

More Roads for Less Money Is Conference Theme

THE Tenth Annual Asphalt Paving Conference will be held at the Roosevelt Hotel, New Orleans, from December 5 to 9, with a business and technical program designed to consider current problems of most importance to national, state and county highway officials, engineers, technologists and contractors. An entertainment program has been designed to make the Crescent City trip memorable for all who attend the meeting. The conference will be held under the auspices of the Asphalt Institute of New York and the Association of Asphalt Paving Technologists.

J. E. Pennybacker, managing director of the Asphalt Institute, has announced that highlights include an explanation by S. S. Lewis, Pennsylvania Secretary of Highways of how that state is solving its farm-to-market problem, and an address by Thomas H. MacDonald, chief of the United States Bureau of Public Roads. Representatives of 75 asphalt road equipment manufacturers will contribute authentic information on the latest technical developments pertaining to road building, thus making the conference serve as a clearing-house of the latest advances in asphalt road construction. W. R. Boyd, executive vice-president of the American Petroleum Institute, will deliver a comprehensive address on diversion of gas tax funds from road building purposes.

The main function of the forthcoming conference, explained Mr. Pennybacker, is to help road officials and engineers solve the nationally vital question of how to make smaller road budgets meet ever-expanding road building programs.

Possible Market for Lime!

THE United States Bureau of Mines has recently issued a 76-p. booklet (Bulletin 360) on "Removal of Soot from Furnaces and Flues by the Use of Salts or Compounds," which contains some interesting information for house holders who stoke their own furnaces, but what should interest lime manufacturers the most is the fact that the first English patent for a "smoke prevention composition," issued in 1856, was: Quicklime or substance containing it, with or without soda ash or other alkaline substance; quicklime and 1/20 part soda ash recommended.

It doesn't appear that the Bureau of Mines made any tests of lime, or lime compounds except chloride of lime, as soot removers, but in the days of Victorian England lime must have been considered to have some virtues or no one would have taken the trouble to patent its use. Perhaps some lime manufacturer will be sufficiently interested to experiment on his own account.

One trouble with marketing lime is that its many virtues were better known to the ancients than to many modern manufacturers.

E. L. Coppock to Succeed Dr. Ellerbeck

AS SUCCESSOR to the late Dr. W. L. Ellerbeck, president and general manager of the Nephi Plaster and Manufacturing Co., Salt Lake City, Utah, the directors have chosen E. L. Coppock, heretofore vice-president and assistant manager of the company.

Mr. Coppock will also become general manager of another firm managed by Dr. Ellerbeck, the Utah Lime and Stone Co., also of Salt Lake City, but he has not assumed the presidency of this concern. It was stated that the directors would elect a president a little later.

Pioneer Sand Co. Host to Sand and Gravel Producers

BETWEEN 35 and 40 members of the Missouri Valley Sand and Gravel Association were expected in St. Joseph October 5 for their fall meeting. It was planned to hold their meetings on a barge of the Pioneer Sand Co., and an inspection trip of the companies plant and of the river operations were included in the program. The plant of the Pioneer Sand Co., of which Capt. R. J. Stewart is general manager, was described in the August 1, 1931 issue of Rock Products.

E. E. Haight

ELBERT E. HAIGHT, 53, president of the Concrete Publishing Co., Chicago, Ill., publishers of *Concrete*, died at the St. Frances hospital on October 15. Before his association with the Concrete Publishing Co. in 1925 he was western manager of the Class Journal Co. for 18 years. For a number of years he served on the executive committee of the Associated Business Papers, Inc.

Mr. Haight graduated from the University of Michigan in 1900. He is survived by his widow and two children.

Concrete Paving Yardage

CONCRETE PAVEMENT yardage as awarded in the United States during September and for the period ending October 1, as reported by the Portland Cement Association, follow:

	Sq. yd. awarded during September 1, 1932	Total sq. yd. awarded to October 1, 1932
Roads	10,690,223	68,497,218
Streets	1,948,658	7,692,910
Alleys	14,493	274,066
Total	12,653,374	76,464,194

S. L. Avery Jr.

SEWELL L. AVERY, Jr., son of the president of the United States Gypsum Co., died at the home of his parents in Chicago October 11. He was 31 years old and until last summer had been manager of the Philadelphia, Penn., plant of the company.

Recent Prices Bid and Contracts Awarded

Tiffin, Ohio. Low prices continue to rule in county stone contracts. Where formerly the county was compelled to pay from $1 upward per ton for its road stone, stone has been bought this summer as low as 40 c. Bids for two roads opened October 2 contained bids as low as 65 and 70 c. per ton.

Lincoln, Kan. Contracts for five miles of gravel on county highway 426 were let here recently. Bids for the work averaged 7 c. for loading and 4 c. for hauling per yd. mi.

Adopts Group Life Insurance Program

AN EMPLOYES' GROUP life insurance program, supplemented by accident and health benefits, has been adopted by the Independent Gravel Co. of Joplin, Mo., for the benefit of its entire personnel. The Metropolitan Life Insurance Co. is administering the plan on a cooperative basis, with employer and employes sharing the cost. Under the group plan, life insurance will be in individual amounts of $1000 and $2000, according to the rank of the employe. In case of sickness or injury incurred off the job, weekly benefits of $10 and $20 will be paid.

In conjunction with the group insurance program, employes are entitled to the benefits of a free visiting nurse service during sickness or injury. This service, maintained by the insurance company, includes the periodical distribution of pamphlets on disease prevention and health conservation.

The Hannibal, Mo., branch of the company also is covered by the group plan.

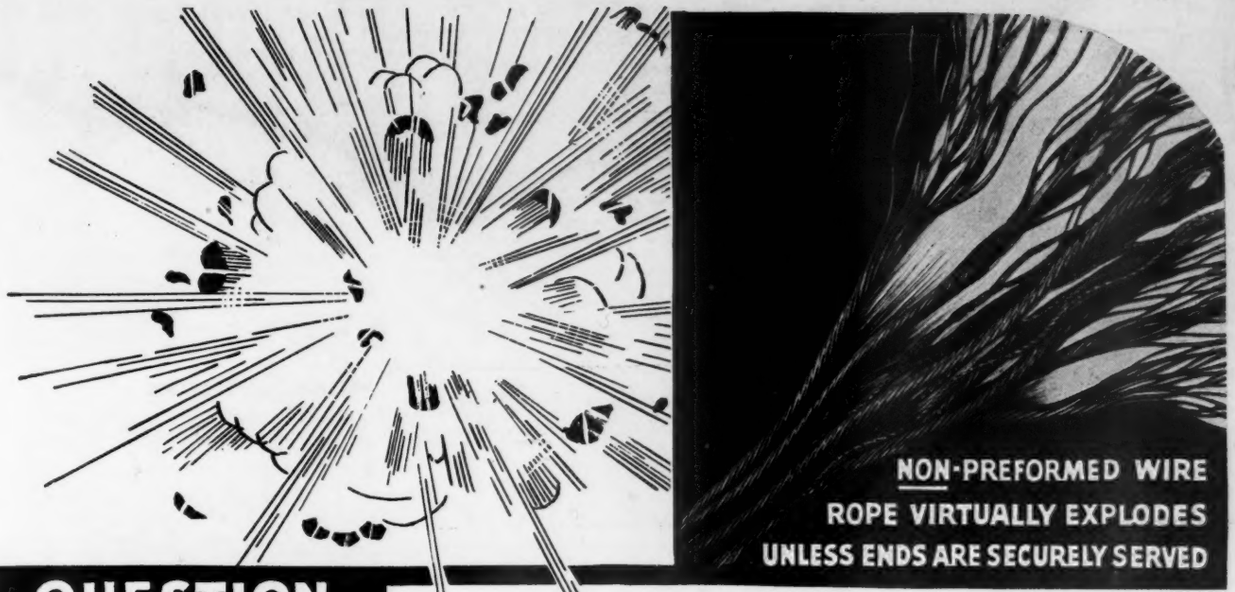
Officers of National Portland Cement Co. Resign

RESIGNATIONS of Robert H. Anderson of Ambler, Penn., as president of the National Portland Cement Co., and Louis Rafetto, as treasurer, are accepted by directors, Mr. Rafetto has revealed, the *Bath* (Penn.) *News* states.

They have resigned because they "realize how difficult" it would be at this time to sell a new issue of stock, it is reported The company is about to float a new issue of its preferred stock, Mr. Rafetto said.

Manitoba Glass Sand Development

SIGNIFICANT of the current trend in Canadian industry, the Dominion Glass Co. is now purchasing sand requirements for its Redcliff, Alta., Canada, plant from domestic sources. Formerly this unit received its sand supplies from foreign sources, but after a series of tests and experiments the company has discovered a suitable substitute available in Winnipeg. Some 5000 tons of sand have been ordered from that center.

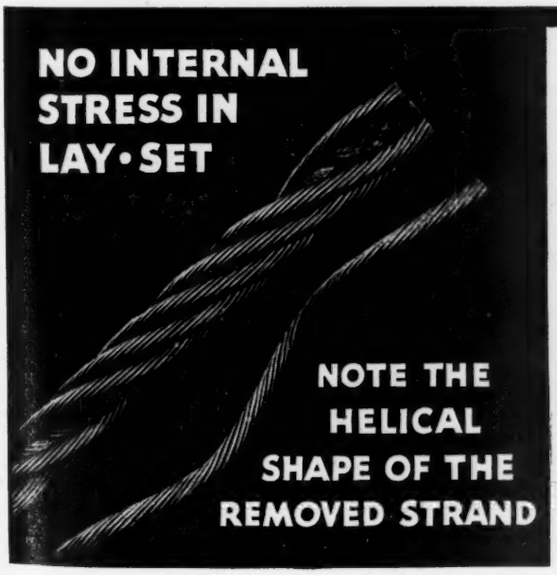


QUESTION

What is internal stress . . . and why is it detrimental to wire rope life? In non-preformed wire rope, strands and wires are forcibly held in place—under spring tension. Working and bending under this internal stress, wire rope cannot possibly give its full quota of service. Earlier fatigue and premature breakage of outer wires is a direct result of internal stress.

In LAY-SET Preformed Wire Rope internal stress is eliminated by preforming wires and strands so they lie naturally in position . . . resulting in a mechanically perfect rope . . . with equal strand load balance . . . equal distribution of stresses . . . and uniform wear. LAY-SET Preformed Wire Rope is easier to handle, resists kinking, high-stranding, low-stranding, bird-caging, all of which make for *much longer average* service with LAY-SET.

THE ANSWER



Put LAY-SET Preformed Wire Rope to work . . . side by side with any brand of non-preformed wire rope of the same size, type, grade and construction . . . If you keep an accurate record of service you will find that Lay-Set will out-service, out-work and out-live non-preformed wire rope by a wide margin.

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WILKES-BARRE, PENNSYLVANIA

New York Pittsburgh Chicago Denver Fort Worth Los Angeles
San Francisco Birmingham Philadelphia Tacoma

THE INDUSTRY

Incorporations

Maryland Green Marble Corp., Elkton, Md. Wm. P. Whitaker and Curtis O. Tyson.

Bayview Concrete Construction Corp., Inwood, N. Y., $10,000. M. Brandt, Far Rockaway, N. Y.

Western Gravel and Contracting Co., St. Louis, Mo., $15,000. Earl Younger and Paul Memhardt.

Tuscola Sand and Gravel Co., 1405 Broadway, Flint, Mich. R. C. Baxter, 831 Warren St., Flint, Mich.

Republic Sand and Gravel Corp., 350 Madison Ave., New York City, 100 shares common. J. E. Gilbert.

Goldgulch Gravel Co., Suite 3200, 33 N. La Salle St., Chicago, Ill., 100 shares of no par value. M. L. Middlekauff, S. M. Alexander and E. K. Hitchcock.

Quarries

Big Rock Stone and Material Co., Little Rock, Ark., has resumed operations on a full-time schedule.

J. E. Patrick, attorney at New Philadelphia, Ohio, has been appointed receiver of the Standard Rock, Inc., and empowered to dissolve the corporation.

Kelly Island Lime and Transport Co. expected to complete a railroad spur to its new quarry at Bell, Mich., by October 15, when it planned to start operation of its crushing plant.

Red Oak, Ia. Albert Mulvenna has installed a rock crushing plant on the William Gammell farm near here in preparation for surfacing Highway 48. It is expected to operate the plant day and night.

Sand and Gravel

Pacific Coast Aggregates, Inc., has started operation at its Niles, Calif., gravel pit.

Clear Lake Sand and Gravel Co., Clear Lake, Ia., is operating its plant 14 hours a day.

Ward Sand and Gravel Co., Oxford, Mich., after being closed since last fall, reopened its plant September 22.

Lenawee Sand and Gravel Co., Adrian, Mich., has raised its dredge which sank some time ago in its gravel pit.

St. Louis Material and Sand Co., St. Louis, Mo. has spent $90,000 on a new sand distributing plant there.

Crow Creek Sand and Gravel Co., Little Rock, Ark., has resumed operation after being idle for some months.

C. S. Cary and Son, Sparta, Ga., have opened a gravel pit near Norris. The material, it is said, has been approved for state road improvement.

Zempter Construction Co., Dallas, Tex., is putting in a gravel plant on the Pease river near Quanah from which it will supply material for road work in that vicinity.

Philip Grossman, president of the United Materials Co., Milwaukee, Wis., has been appointed receiver for the Hillside Washed Sand and Gravel Co. "The company can solve its difficulty without loss to anyone," said Mr. Grossman after his appointment.

Cement

Aetna Portland Cement Co. resumed operation at its Fenton, Mich., plant October 1.

Oregon Portland Cement Co., Portland, Ore., resumed operation of its Oregon City plant October 1.

Southwestern Portland Cement Co. expected to resume operation at its El Paso, Tex., plant October 20.

Alpha Portland Cement Co. has reopened its Manheim, W. Va., plant and will operate in six-hour shifts.

Columbia division of the Pittsburgh Plate Glass Co. is increasing production of its Fultonham, Ohio, plant.

Pennsylvania-Dixie Cement Corp. closed its Valley Junction, Ia., plant October 1. Shipments will be made from stock.

Lehigh Portland Cement Co. has reopened its Birmingham, Ala., plant and will resume operation at its Oglesby, Ill., plant in November. Both of these plants have been closed for several months.

Century Cement Corp. has issued notice for a meeting of creditors at Kingston, N. Y., on October 21. Matters to be considered include the continued operation and ultimate disposition of the rights and properties of the bankrupt.

Nebraska Cement Co., Denver, Colo., has opened a new quarry and has extended tracks to the site to supply its plant at Superior, Neb. The old quarry will be used as a source of rock for many months and it will be some time before development work at the new quarry will be completed and it is ready for production.

Gypsum

Gypsum, Lime and Alabastine, Canada, Ltd., started operating all departments of its new Westminster plant early in September for the first time in several months.

Lime

Holmes Lime and Cement Co., Felton, Calif., is planning to overhaul and modernize its plant there.

Keith Lime and Specialties Co., Seattle, Wash., has appointed C. F. Uhden, formerly chief engineer for the city of Seattle, as manager.

Valley Lime Co. of Lindsay, Calif., is making its first shipment of lime from the Shell ranch near Rawhide, Calif., for sugar refining. Future developments will depend on results of this test shipment.

A. D. Paten and Co., Seattle, Wash., is opening a deposit near East Sound, where it expects to develop production of lime. Shipments to paper mills are contemplated and a dock is being built to provide for water shipment.

Rockland and Rockport Lime Corp., Rockland, Me., is installing equipment for the manufacture of hydrate and agricultural lime to replace the loss in production facilities resulting from fire July 8, as reported in the July 16 issue of ROCK PRODUCTS.

Cement Products

Art Concrete Works, Pasadena, Calif., reports a concrete receptacle for garbage which it is selling has gained much favor.

Frank Lamb and Sons, Delphi, Ind., have moved their plant from Battle Ground to Delphi. They manufacture burial vaults, urns and a number of other concrete products.

Otto Walter, Perrysville, Ind., has developed a machine for the manufacture of concrete roofing tile which it is claimed will produce this tile at a price competitive with wood and asphalt shingles.

Shelton Concrete Products Co., Shelton, Wash., reports 1932 as its busiest year to date and that it has not had a single idle day at the plant during the year. Concrete pipe accounts for most of the production.

Other Rock Products

Standard Bauxite and Chemical Co. is building a new plant near Benton, Ark.

Hopkins, Mo. A Kansas City company is investigating a rock asphalt deposit near here.

Duquesne Slag Products Co., Pittsburgh, Penn., is planning a loading dock near Dravosburg, Penn., with mechanical loading and handling equipment.

H. H. Helbush and Co., Los Angeles, Calif., is considering reopening phosphate mines of the Agricultural Potassium Phosphate Co. at Paris, Ida.

Sanford, N. C. It is rumored that a New Jersey company is negotiating for the purchase of the talc mine property at Glendon. The mine has not been operating for several years.

Santa Rosa Rock Asphalt Co. Santa Rosa, N. Mex., has started operation. Its product will be used on highway projects as soon as rail connections can be completed, it is reported.

Pottsville, Penn. A deposit of Dickite, one of the world's most rare minerals, was found in the Pine Knot Colliery near here recently. It is used in the manufacture of porcelains and this is said to be the eleventh known deposit in the world.

Personals

F. J. Rudd has been appointed engineer of the motor department of the General Electric Co., Lynn, Mass., to succeed L. E. Underwood, who has been made manager of the Pittsfield works.

Samuel Hobbs, structural engineer of the Portland Cement Association, recently spoke at the luncheon of the American Association of Engineers in Long Beach, Calif., on "Practical Methods of Proportioning Concrete."

George E. Warren, assistant general manager of the Portland Cement Association, reports efforts of the Reconstruction Finance Corporation to stimulate construction are having a beneficial effect on public morale on the Pacific coast.

Obituaries

Edward J. Norris, 84, pioneer manufacturer of concrete products in Terre Haute, Ind., died October 2.

Roy Hensel, 36, died from injuries sustained in a premature blast of dynamite in the quarry of the Interstate Construction Co. near West Point, Ia.

Wilfred L. Smith, 62, associated more than 25 years with the firm of J. K. Davison and Bro., Pittsburgh, Penn., died September 25 at his home.

Manufacturers

Keystone Lubricating Co., Philadelphia, Penn., is rebuilding its plant which was completely destroyed by fire October 3.

H. B. Fuller Equipment Co., Cleveland, Ohio, has been appointed distributor of the Link-Belt line of shovels, cranes and draglines in northeastern Ohio.

Young Radiator Co., Racine, Wis., reports that production of varied copper heat transfer products has continued at an advanced level over the first half of the year.

General Electric Co., Schenectady, N. Y., announces that the 2% deduction from wages in behalf of the emergency unemployment relief will be continued through the winter by vote of employes' representatives of the Schenectady works.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., announces that it is prepared to spend $1,260,000 for raw materials, supplies and development work that will open extensive new markets for electrical equipment. The funds will be expended within the next few months.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on ing for any of the items kindly mention Rock Products. *request to the firm issuing the publication. When writ-*

Floodlights. GEA1505 describes the application of floodlights for various uses. GENERAL ELECTRIC CO., Schenectady, N. Y.

Blasting. Catalog features Cordeau - Bickford, a detonating fuse. Also contains much information on a new technique in blasting, using one detonator placed at some distance from the actual charge, the detonating wave being conveyed to and through the charge by the detonating fuse.—ENSIGN-BICKFORD Co., Sinsburg, Conn.

On blasting

Diesel Engines. Folder shows sectional views of Superior Diesel stationary engines and discusses operating efficiency. SUPERIOR ENGINE CO., Springfield, Ohio.

Dragline Bucket. Bulletin describes the Red Arch dragline buckets, illustrating features of construction. BUCYRUS-ERIE CO., South Milwaukee, Wis.

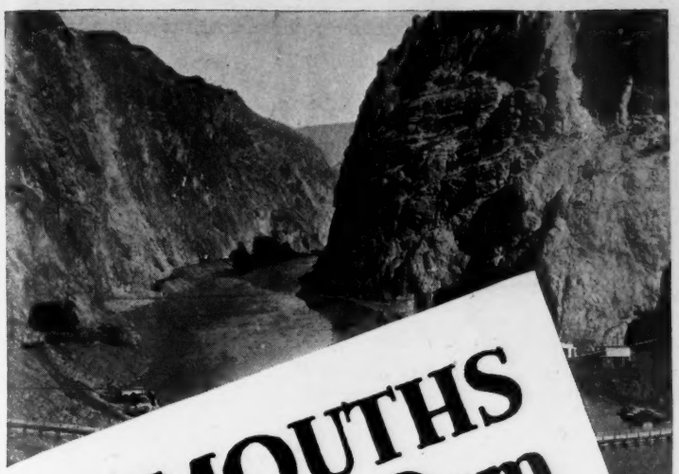
Trailers. Bulletin describes Williams extra capacity heavy duty trailer showing construction details with specifications. WELLMAN ENGINEERING CO., Cleveland, Ohio.

Bulk Cement Pumps. Bulletin describes Type "F" Fuller-Kinyon pump for unloading bulk cement from cars. Installation views are shown. FULLER CO., Catasauqua, Penn.

Cement Mill Equipment. Bulletin describes bolts, grinding balls, liners, screen plates and buckets for cement mills made of special steel. JEFFREY MANUFACTURING CO., Columbus, Ohio.

Dredges. Bulletin P 6 describes hydraulic pipe line dredge, *Three Brothers*, operated by R. P. Emerick Dredging Co., Mount Clemens, Mich. Complete operation is described. AMERICAN MANGANESE STEEL CO., Chicago Heights, Ill.

Grinding and Drying Equipment. Folder describes Raymond equipment for advanced mill-drying operations and discusses various drying and grinding problems in the nonmetallic mineral industry. Installations of the roller type kiln mill and an air-drying pulverizer are shown. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.



Left: Site of the world's largest and highest dam—730 ft. high, 650 ft. thick at base, 1180 ft. long on top, will contain the largest single mass of concrete ever placed—3,400,000 cu. yd. with an additional 1,000,000 ft. for other construction. Will form a lake 115 miles long 582 ft. deep with a storage capacity of 30,500,000 acre-ft.

PLYMOUTHS at Hoover Dam

In building the great Hoover Dam the first gasoline locomotive on the job was a Plymouth—used by Lewis Construction Co. hauling rails for the new railroad to the dam. « « Three Plymouths are used by Six Companies, Inc.,—one for handling carloads of cement and two for switching gravel cars. « « Plymouth Gasoline Locomotives have helped build the great dams of America—Coolidge, Owyhee, Rock Island, Exchequer, Don Pedro, Starved Rock, Conowingo, Safe Harbor and many others. « « On big jobs or little—where speed, dependability and economy count—the Plymouth is the answer to your haulage problem.

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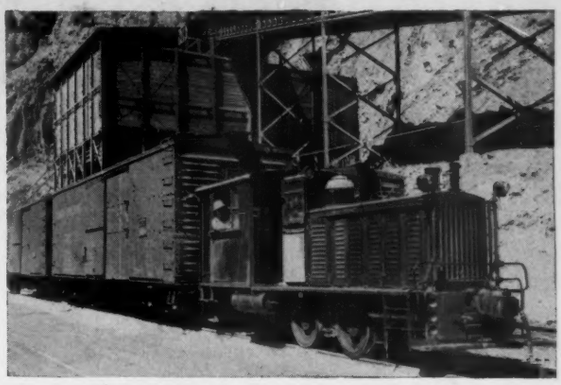
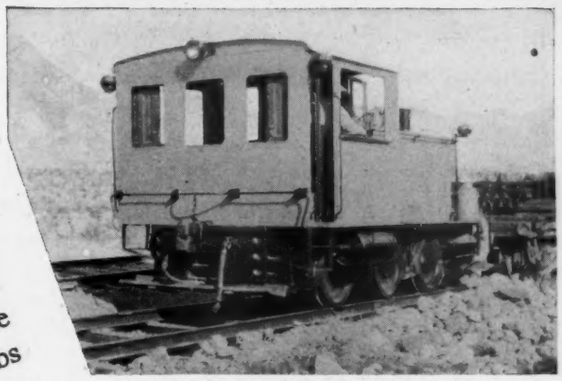
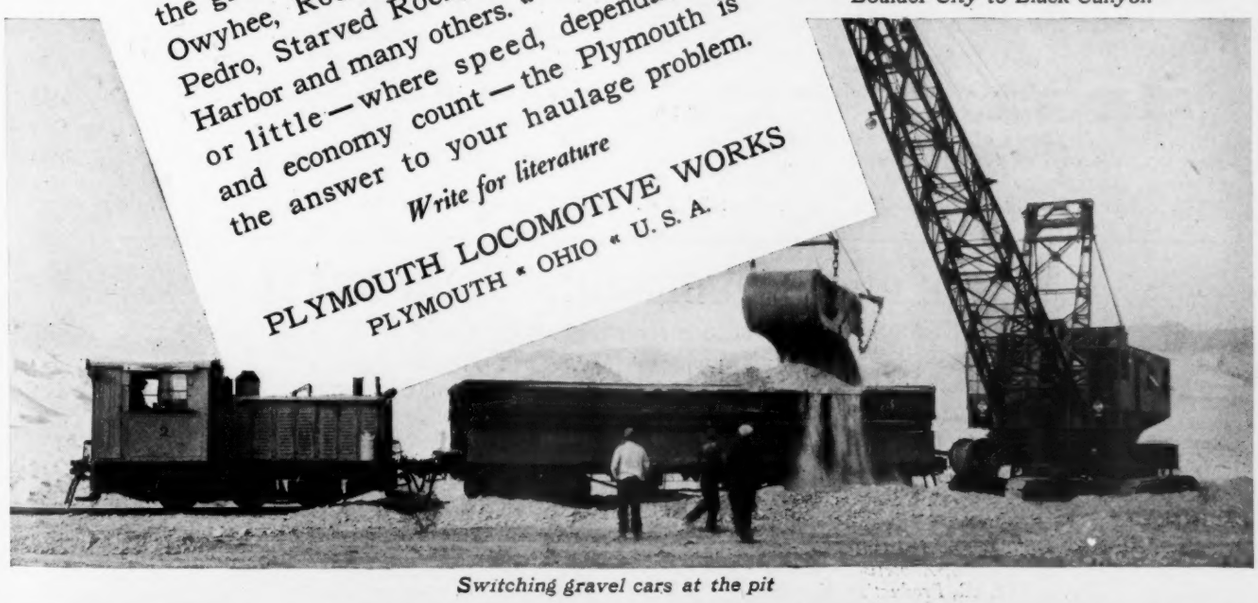


Hauling Carloads of Cement in Bulk—250 bbls. to the Car



Hauling Rail for 10½ mile Railroad from Boulder City to Black Canyon



Switching gravel cars at the pit

PLYMOUTH

Gasoline and Diesel Locomotives

Recognized the World Over as the Leader in Its Field

Rock Products

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Contents for November 5, 1932

Centralized Control of Widely Distributed Crushed Stone Plants 11-15
Operations of the General Crushed Stone Co., Easton, Penn. By Earl C. Harsh.

Plotting Sieve Tests of Aggregates 16-19
Part II.—Single scale and triaxial plots. By Edmund Shaw.

Opportunities for Using Indicating and Recording Control Instruments in the Rock Products Industries 20-23
Part X—Instrumentation in the ceramic industry-tunnel kilns. By James R. Withrow.

Mining Methods and Costs at the Hart Spur Pit of the Fort Worth Sand and Gravel Co., Fort Worth, Tex. 24-26
By Thomas E. Popplewell.

Hydraulic Limes 27
Improvements in manufacture and their possible future.

The Recast Analysis and Its Relation to the Chemistry of Portland Cement 28-29
Part VI—Course of crystallization beyond three-component system. By Louis A. Dahl.

A Successful New Concrete Product — "Madestone" 44-46
By Miles N. Clair.

Medusa Introduces New Type of Cement for Macadam Binder 47

A New Cement Kiln Refractory 48-54
By C. H. Sonntag.

Removal of Shale and Soft Stone from Gravel 56-57
By C. S. Huntington.

Departments

Chemists' Corner 28-29
Hints and Helps for Superintendents 30-31
Rock Products Clinic 32
Editorial Comment 34-35
Financial News and Comment 36-37
Foreign Abstracts and Patent Review 38-39
Traffic and Transportation 40-41
Cement Products 44-46
New Machinery and Equipment 58-59
The Industry 60
Classified Directory of Advertisers 62, 64

(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

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